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22Wo No. 1 December 15, 1917.

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UNITED STATES FOREST SERVICE

WOOD FUEL ITEMS

(These Items will be issued from time to time during the emergency Fuel situation.)

The New England Wood Fuel Conference which was held in Boston under the auspices of Mr. James J. Storrow, Fuel Administrator of New England, has resulted in the organization of a campaign in nearly all of the six states.

The Massachusetts Wood Committee, which was organized as a result of this conference, is made up as follows:- James J. Storrow, Fuel Administrator of Massachusetts; Edward Chapman, Master State Grange; Frank Rane, State Forester; Sumner Parker, County Agent Leader; Prof. W. D. Clark, Mass. Agricultural College; Harris A. Reynolds, Mass. Forestry Ass'n; Allen Chamberlain, Publicist; A. F. Hawes, U. S. Dept. Agriculture; Prof. Clark is acting as secretary for the Committee. His office is with the Fuel Administrator, State House, Boston.

An attractive poster has been printed in red and black ink with the heading: "CUT A CORD." This poster is being supplied all the New England States signed by the Administrator of the respective State. Much newspaper publicity has also been obtained.

The Boston & Maine R. R. and N. Y. H. & H. R. R. have decided to stop the burning of old ties. The latter company

has been burning 1,750,000 ties a year. It is estimated that these are equivalent to 30,000 tons of coal. The Engineering Department of the R. R. is working on a device to break or split ties by pressure in order to save sawing.

Mr. Kneeland, of the Mass. Forestry Dept., reports that a 5 or 6 ton motor truck, such as the Pierce-Arrow or Packard, will haul 4 cords of wood to a load and will cover 6 or 7 miles on 1 gallon of gasoline. Such a truck with a driver can be hired for $22.50 a day. An extra man is required to handle the wood. Such a truck will travel 12 miles an hour, and will make about 75 miles a day allowing for loading and unloading. It takes one hour to load a truck with 4-ft., and two hours with stove wood. A truck of this kind with a platform body costs $5,500, and they are commonly sold for $1,000 down, and $50 in weekly payments.

The annual conference of County Agents and Farm Bureau representatives was held in Durham, N. H., December 5 and 6, and was addressed regarding the Wood Fuel Campaign by Fuel Administrator Floyd and A. F. Hawes. The County Agents appointed a Committee which formulated plans whereby they could help out in the campaign, and this report was accepted by the conference. This program includes the appointment of men on the executive committees of the Farm Bureaus, who shall be responsible for the wood campaign. In many cases the local Fuel Administrators will be appointed in order to tie up more closely the various agencies concerned.

Mr. Philip W. Ayres, Secretary of the Society for the Protection of the N. H. Forests and his assistant are devoting three weeks beginning December 10th to assisting the Fuel Administrator in the wood campaign. State Forester Hastings and Prof. Woodward are also devoting some time to this work under the project signed in the summer.

The Fuel Administrator for Claremont, N. H., reports that the Chamber of Commerce has appropriated $1,000 for buying stumpage at a price not to exceed $1.50 per cord; and for cutting and hauling. The wood is to be sold at cost price.

Mr. Frank L. Hildebrand, representative of the Federal Trade Commission in New England, reports that because of the shortage of wood in northern New Hampshire and Vermont more coal than usual has been consumed. Many localities have had their full quota of coal, and it is doubtful whether they can get more since it would be unfair to other sections.

The Press reports that President Thomas of Middlebury College is organizing the faculty to cut wood during the Christmas holidays in the college forest.

On October 13th A. W. McAllister, the Fuel Administrator of North Carolina issued a timely circular urging cities and towns as a war measure to furnish wood to consumers at cost. His plan is as follows:

"Let each municipality (1) buy wood by wholesale in large quantities for delivery by wagon or railroad at a municipal

woodyard, which should be located on a railroad siding if wood is to be shipped in by rail; (2) equip the yard with power-saws, etc., utilizing such available equipment as the municipality already has; (3) use convict labor, workhouse labor, or street force to do the work; (4) use the municipal teams for delivery of wood to consumer, cut ready for consumption at actual cost; (5) put somebody in charge of the work who is capable of doing it successfully; (6) do not use coal cars for shipping in your supply of wood; (7) if wood can not be bought in sufficient quantities to supply the municipal yard, contract with land owners for the privilege of cutting the wood under forest conservation restrictions and direct the cutting of the wood with your own labor; (8) encourage consumers to substitute sheet iron wood stoves for their coal burners, as the saving in price will more than pay for the outlay."

There is no time to be lost. Let no time be wasted on the constitutionality or legality of this proposition. We have taken legal advice to the effect that this work can properly be done by municipalities and we are satisfied that no court is likely to interfere with the program of emergency relief which will not only help win the war, but which will prevent suffering this winter on the part of those who can ill afford to buy wood at any price, and supply the public with a necessity at prices that will not be burdensome."

A timber operator in North Carolina has offered to the Government the cordwood of 300 acres to be worked for increasing the fuel wood supply.

The Pascagoula Street Railway and Power Company, Mississippi, are now using down timber for fuel in place of coal. They find one cord equivalent to 83-hundredths of a ton of coal. They are investigating to find better methods of cutting up the wood and transporting it than their present method of sawing by hand and transporting by railroad cars. Some type of power-driven portable saw and motor trucks are likely to be employed to meet the present difficulties.

Tennessee Is Using Wood

The county fuel administrations for Tennessee are setting an example to the country in the task of conserving coal by the use of wood.

War fuel companies have been organized in practically every county of that State. Each company has a manager who superintends wood cutting. Six per cent on the money invested is all the profit charged by these concerns, which are directed by patriotic citizens. Wood is being purchased in Tennessee for $4 a cord delivered. It will retail at $5.50 a cord for fire wood and $6.50 a cord for stove wood.

Mr. Myer, Tennessee's Fuel Administrator, estimates there is enough wood on the outskirts of Jackson to keep the people there warm for many years, without the use of a particle of coal.

The Tennessee fuel administration was offered 5,000 cords of cedar, near Chapel Hill, Tenn., at a very low rate. Another patriotic offer was the valuable wood refuse from wood-working plants at $1.25 a cord f.o.b. cars.

Most of the country cook stoves can be made wood burners with little trouble, and in Tennessee the consumers of wood can get a wood grate to replace their old one by applying to the dealer.

In the face of what he has already been able to accomplish, Mr. Myer's appeal to the rest of the states is particularly forceful. He urges farmers everywhere to stop driving into town to buy coal, thus depleting the supply needed for people in other sections who have no choice between coal and no fuel.

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No. 2 December 22, 1917.

UNITED STATES DEPARTMENT OF AGRICULTURE

WOOD FUEL ITEMS

(These Items dealing with wood as a fuel will be issued from time to time during the emergency situation.)

Maine

The Fuel Administrator of Maine has appointed as a Wood Fuel Committee the following: Dr. Chas. D. Woods, Director of Experiment Station, Orono, Chairman; Forrest Colby, Forest Commissioner, and A. M. G. Soule, of the State Department of Agriculture, both of Augusta. The committee has already organized a publicity campaign through the press and the State Grange.

Dr. Woods estimates that the ashes from a cord of hardwood will furnish about 20 pounds of lime, more than 3 pounds of potash, and a half pound of phosphoric acid, and that they have a value at present prices of about $1. With the present scarcity of potash this is an important item.

New Hampshire

The local Fuel Administrators of New Hampshire met with State Administrator Chas. M. Floyd at Manchester on December 14. The conference which was arranged by Mr. Clark, Secretary of the Administration and Mr. Philip W. Ayres, was a very practical one and brought forth many valuable suggestions. Besides the various administrators there were present several county agents, Prof. Woodward of the N. H. Agricultural College, and A. F. Hawes, representing the U. S. Department of Agriculture.

Fuel Administrator Floyd has sent over 900 letters to the clergymen of the State urging them to shoulder an ax and set an example to the members of their congregation in the chopping and burning of wood.

Local Administrator Shurtleff of Lancaster, N. H., reported that 20 business men of his town have contracted for 500 runs of 13" wood at $3 a run, the same to be sold by them at cost.

An effort will be made to have lumber companies keep their crews chopping cordwood after completing the lumber jobs and before the spring drive.

Massachusetts

Through the efforts of the Wood Fuel Committee, the Appalachian Club has undertaken to popularize the cutting of wood as a sport. On December 15 about one hundred members armed with axes invaded a woodlot in Lincoln, Mass., which was provided by Hon. Hames J. Storrow, Fuel Administrator of New England. Several cords of wood were cut, as will be illustrated on the moving picture screens throughout the country. It is hoped that other clubs will take up this useful form of exercise.

The Boston and Maine Railroad Company is gathering all waste wood in its yards, and along its right-of-way for use in heating its stations, freight houses, and shops. It is expected that enough fuel will thus be secured to heat all of the larger stations throughout the winter, without using any coal.

Connecticut

The State Fuel Administrator has appointed Mr. W. O. Filley, State Forester, as chairman of the "Wood for Fuel" Committee. The following members have been added: F. E. Blakeman, Fairfield Co.; Everett W. Doane, Middlesex Co.; Oliver A. Hiscox, Windham Co.; Frank A. Rockwood, New London Co.; F. H. Stadtmueller, Hartford Co.; Chas. R. Treat, New Haven Co.; D. J. Warner, Litchfield Co.; W. J. Warner, Tolland Co. The committee is at present engaged in gathering information from the wood buyers through the local Fuel Committees.

New York

A press item states that a number of wealthy residents of Oyster Bay are distributing fuel wood from their estates to local citizens. Much of the wood was cut during the summer and saved for use this winter.

Pennsylvania

During the past year the Commissioner of Forestry has been selling wood from the Pine Grove State Forest to the Bethleham Steel Works at Steelton, for use as fuel. Some 116 cars holding from 16 to 20 cords each have been shipped, in this way, a distance of from 25 to 30 miles. The wood is mostly chestnut and can be produced at a price to make it an attractive fuel in competition with coal.

There is plenty of wood in many of the State forests which should be cut, but the road system has not as yet been completed sufficiently to make it all accessible.

New Jersey

The New Jersey Department of Conservation and Development has just published a bulletin entitled "Wood Fuel" by R. D. Forbes, Assistant Forester. It is stated "that there is no doubt that 500,000 cords of wood could be cut today from the two million acres of forest in the State without removing a single tree whose present use would not prevent its loss through death and decay, or benefit the surrounding overcrowded stand. It is suggested that a coal-burning stove can be converted into a wood-burning stove by removing the fire brick and substituting lighter bricks at a cost of about $1.25. The author estimates that a cord of hardwood will produce 40 lbs. of ashes containing 10 per cent, or 4 lbs. of potash now worth $1, and that the lime and phosphoric acid are worth six cents more. It is important always to keep wood ashes under cover, as they leach rapidly if allowed to become damp. New ashes should be allowed to cool before they are dumped on the ash heap."

Tennessee

The War Fuel Company of Greenville is setting an example in public-spiritedness which is worth noting. Its directors have gone a step farther than the Fuel Administrator asked, and instead of allowing themselves a 6 per cent profit are buying wood and retailing it to the public at actual cost.

An opera-house manager in Bristol, who had always burned coal, is now using wood fuel. He asserts that his fuel costs have been cut in half. He is therefore saving money for himself, while at the same time he is releasing coal for our war industries.

Fuel

A preliminary survey of the local fuel situation at Missoula has been made by the Forest Service. It was found that there is a considerable shortage in the supply of mill-wood which ordinarily furnishes an important part of the total fuel consumption. Since there is little likelihood that this shortage can be met by an increased supply of coal, efforts were made to locate adequate supplies of cordwood within a reasonable distance of town. Such a supply was found in the form of tops and defective trees on logged-off lands belonging to the Anaconda Copper Mining Company, which has agreed to permit cutting of this wood free of charge.

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No. 3 December 27, 1917.

UNITED STATES DEPARTMENT OF AGRICULTURE

WOOD FUEL ITEMS

(These items dealing with wood as a fuel will be issued from time to time during the emergency situation)

To meet the critical fuel situation in Russia the Temporary Government during the past summer worked out a plan for developing the fuelwood resources of the country. This plan involved the assembling of horses, trucks, and barges, and the organization of 500,000 laborers to cut and transport cordwood.

As early as last June anthracite coal was selling for $50 a ton in Buenos Aires. Steps have been taken to bring cordwood down the Parana on barges to supply river ports with fuel.

Mill waste is very widely used as fuel in the Pacific Northwest, on account of the abundance of such material and the high cost of coal. Much of this waste is burned to supply power for the mills themselves, while slabwood is largely used as fuel by individuals. Many manufacturing plants burn four-foot slabs. One of the largest users a few years ago in Portland, Oregon, was the Portland General Electric Co., which used from 100 to 150 loads of 200 cubic feet each of mixed sawdust and "hog" fuel per day. Tests made at one Portland plant on the relative costs of different fuels showed that at prices then prevailing sawdust produced power for $.0057 per Kilowatt hour, mixed sawdust and slabs $.0067, slabs $.0083, and fuel oil $.0097. It was found that one cord of dry fir slabs is equal in heating value to one barrel of oil.

The St. Paul and Tacoma Lumber Co. at Tacoma, Washington, has arranged to dispose of all its waste without the use of a burner. With two "hogs" it cuts 35 cords of waste per hour. Part of this is used in the company's own steam plants, and the rest is sold to the Tacoma District Heating Co. and other steam plants in the business district.

The Italian Government has taken measures to speed up the production of wood fuel. Regulations regarding firewood have recently been extended to cover almond shells, pinenut shells, and pine cones. Olive husks from which the oil has been extracted must be put at the disposal of the national fuel authorities who attend to their distribution.

The following items of cost of producing cordwood, collected from a number of operations in different parts of the Northeast, are of interest. It should of course be remembered that conditions vary so widely that no figures can be generally applied even to rather limited regions.

Cutting, which has in the past been done for as low as $1 per cord, will now cost from $1.50 to $3. Skidding out to a road should cost about 75 cents. Hauling is estimated at from 40 to 60 cents per cord mile. Sawing should cost approximately 70 cents per cord for 16-inch wood, or slightly more for 12-inch lengths. Splitting should cost around $1 per cord. All of these costs of course vary with the species and sizes of the wood as well as with other factors. Stumpage prices vary widely, but will ordinarily be somewhere between $1 and $2 per cord for reasonably accessible timber.

Portable saws run by gasoline engines are quite generally used for working up wood into stove lengths. This is done either in the woods, in central woodyards, or at the consumer's woodpiles. Charges for custom work have been from 50 cents to $1 per cord, depending on the number of cuts and kind of wood, but are now between 75 cents and $1.50.

Costs of operation, based on 3 or 4-men crews and wages of 30 to 35 cents per hour, and a cut of 16 to 20 cords per day, average as follows:

Labor	50	cents per cord
Gasoline	9	" " "
Oil	1	" " "
Depreciation, interest, etc.	10	" " "
Total	70	cents

One company quotes prices on gasoline engines as follows:

1½ HP	$65	6 HP	$250
2 "	80	8 "	300
3 "	125	10 "	400
4 "	200		

For portable engines add approximately $25 for the truck. Saws with frame and belting cost around $25, depending on size of the saw. While engines as small as 1½ HP have been used for running saws, they are not considered so satisfactory as larger ones. A 4-, 5-, or 6-HP engine is considered about right for running a 24 to 26-inch saw, which is the best size for all-round work. Such an engine is also large enough for other farm work. For work on a considerable scale, such as in fuelyards, an 8 to 12 HP engine will probably be better. Estimates of gasoline consumption run from two-thirds of a pint to 1 pint per horsepower per hour.

The press reports that wood fuel is largely used at Camp McClellan, Anniston, Alabama. The tent stoves all burn wood. It is stated that certain wooded areas have been allotted to each unit of the organization, who cut their own fuel.

Tennessee

Barges and other boats, together with 150 laborers employed on government work on the Cumberland and Tennessee rivers, have been offered to the State Fuel Administration to help in relieving the present fuel shortage. They will be used to cut wood and transport it to Nashville and other towns along the rivers.

Indiana

The State Fuel Administration has undertaken a vigorous campaign to push the use of wood fuel instead of coal. It is reported that in many counties dealers are refusing to sell coal to persons who can easily get wood. The State Forestry Department is cooperating in the work by showing where wood may be obtained. Richard Lieber, Secretary of the State Board of Forestry, has recently made an investigation of the wood fuel supply of Indiana. It was found that at prices prevailing early in November wood fuel was as cheap or cheaper than coal. He recommends establishing municipal woodyards, especially for the benefit of the poor. Wood brought to such yards in pole lengths can be cut into stove sizes by the persons who receive it.

Virginia

H. F. Bird, State Fuel Administrator, reports that arrangements have been made for each of the thirty convicts camps in the State to cut 700 cords of wood for public consumption.

Idaho

The Cache National Forest in southeastern Idaho reports a greatly increased demand for cordwood for fuel now that it is difficult to get coal in that region. Much of this material, where used for domestic fuel purposes, is sold to the users at the actual cost of supervising the cutting. Due to past curtailment of cutting in the birch, maple, and aspen along roads and streams, there is now available a supply of fuelwood which can be easily reached to meet the present emergency. The value of past restrictions on cutting is in this case very evident.

Beginning with December 24, the moving picture shows under the management of the Mutual Film Corporation will show the Appalachian Club starting the Cut-a-Cord movement in Lincoln, Massachusetts. This feature will be shown all over the country.

New Hampshire

Fuel Administrator Floyd has written all the High School principals and superintendents of schools urging that every high school boy should be responsible for cutting at least two cords of wood during the Christmas holidays.

Vermont

Extension Director Bradlee reports that at the annual conference of the County Agents the Committee on forestry adopted the following recommendation: "That the County Agents cooperate with the State Forestry Department by using their efforts to further the cutting of wood in order to aid in meeting the shortage emergency as recommended by the Emergency Fuel Administration."

Morrisville, Vt. is reported to have a municipal coal and woodyard.

Ohio

Mr. Secrest, Forester for the Agricultural Experiment Station, reports that a publicity campaign has been initiated to relieve the fuel situation with the use of wood, and that there are unlimited opportunities in Ohio for cordwood production.

WO No. 4 January 4, 1918.

U. S. DEPARTMENT OF AGRICULTURE

WOOD FUEL ITEMS

A conference called by Governor Whitman of New York for the purpose of promoting the use of wood fuel was held in Albany on December 26. Representatives of the State grange, the farm bureaus, timberland owners, the two colleges of forestry, and the Conservation Commission were present. A definite program was agreed upon to be carried out by the State and county fuel administrations, in cooperation with these agencies, and a permanent wood fuel committee was appointed, consisting of F. J. Lowell of Fredonia, Master of the State grange, Professor Ralph S. Hosmer of the department of forestry at Cornell, Professor F. F. Moon of the College of Forestry at Syracuse, A. B. Recknagel, Forester of the Empire State Forest Products Association, and William G. Howard, assistant superintendent of State forests.

For the purpose of obtaining information regarding the supply of fuel wood and to insure cutting of only such wood as may be cut without injuring the woodlands, the State will be divided into four districts, each under the supervision of a trained forester, who will work in close cooperation with the farm bureaus, local granges, and county fuel administrators. One of these men will be provided by Cornell University, one by Syracuse University, and two by the Conservation Commission.

The Wood Fuel Bureau of the Conservation Commission, under the direction of W. G. Howard, will act as a clearing house for all data thus collected. A local wood fuel committee is to be formed in each county, in cooperation with the local fuel administrators. These committees will carry on a publicity campaign to stimulate wood production, and will take steps to organize the work of cutting and transporting wood.

Two timberland owners of northern New York have agreed to sell hardwood on the stump for 15 and 25 cents a cord for local use.

Some 20 members of the faculty of the University of Maine have cut from the college woodlot for their personal use an average of five cords of wood apiece.

It is reported that boys in the rural schools in Indiana have organized "Sawbuck Clubs" to aid in the wood fuel campaign in that State.

In Massachusetts a hundred college students spent their Christmas holidays cutting cordwood.

It is reported that owing to the coal shortage the soldiers at Fort Oglethorpe, Ga., are cutting wood for fuel. The National Army men at Camp Meade, Md., have also recently had to get out and cut cordwood to supply the barracks furnaces.

Several Washington (D.C.) owners have recently offered a quantity of cordwood free to the poor, who are unable to get fuel.

It has been estimated that 50,000,000 wooden ties are discarded every year by railroads of the United States. This amount of material would furnish approximately 1,700,000 cords of firewood.

Some farmers in Delaware are burning wood especially for the ashes, which they use for fertilizer.

It is reported from Georgia that much suffering has been prevented by "emergency wagon trains" of cordwood brought into the towns and cities from rural districts.

Asheville, N. C., has been practically without coal for several days, and the municipal woodyard is working overtime. The wood supply has become so short that no one is allowed as much as a cord at one time.

The North Carolina Fuel Administration has fixed maximum retail prices for fuel wood. At a recent meeting of the Guilford County Fuel Committee, the State Administrator, and representatives of local dealers, prices for Greensboro were fixed at $4.75 per cord delivered to the dealer, and at $7 per cord sawed, split, and delivered to the consumer. Half cord lots are to be sold at not more than $3.75, quarter cord at $2, and one-fifth cord at $1.65.

One method of utilizing the vast amount of cordwood material which is found near many towns and cities is suggested in the organization of "logging bees" such as were common a generation ago in some parts of the country. The men of a neighborhood would get together with axes and saws and in a short time clear up the dead and down timber on a considerable tract of woodland. In those days such material was usually piled and burned to get rid of it--it would be a fairly simple task now to collect the wood at a central point and saw it up for fuel.

The following men from the U. S. Forest Service have been detailed to cooperate with the State and local fuel authorities in the campaign to increase the production and use of wood fuel:

C. R. Tillotson, in Wisconsin and Minnesota
E. H. Frothingham, Ohio and Michigan
C. F. Korstian, Illinois and Missouri
W. N. Sparhawk, Maine, New Hampshire, Vermont
G. N. Lamb, Tennessee and North Carolina
B. MacKaye, District of Columbia

Other men may be assigned to the work later.

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No. 5. January 10, 1918.

U. S. DEPARTMENT OF AGRICULTURE

WOOD FUEL ITEMS

(These items will be issued from time to time during the emergency Fuel situation)

At this time, on account of not desiring to make an increase of unnecessary work, many wealthy people hesitate to remove dead and unsightly trees from their grounds and premises. They feel that such improvement work is a luxury which can well be deferred to a later time when there is no such great demand for urgent war work. Their motive is a patriotic one and is to be commended; but in most localities it will be found that such trees can be used, and in fact are often sorely needed for fuel. With this view, the improvement work can be combined with the production of fuelwood and no labor will be diverted from useful work. It is urged, therefore, that such owners consider this phase of the question and plan accordingly. Obviously this source of fuel supply will not damage the woods or detract from the beauty of the landscape. It is simply utilizing waste wood and keeping the improvements of the estates up through the period of the war.

Owners and managers of woodland estates are directed to this view of the situation in connection with present improvement work.

Data on Fuelwood Operation on the Nittany State Forest, Pennsylvania

Timber

The timber in which the data was collected is second growth chestnut and chestnut oak averaging 6.9 inches D.B.H. and 58 feet high. The ground is level, free from rocks and other obstacles to easy logging. The area was clean cut.

Cutting

The trees are sawed down and trimmed in pole lengths by a crew of 2 men employed at the rate of $1.75 per day of 10 hours. They cut down and trim enough trees to average 15 cords a day, making the cost $.23 per cord.

Skidding

The trees are skidded to the gasoline saw in their entire length. When trees are too long or too heavy they are cut into sections to facilitate the skidding. Skidding distance to the saw does not exceed a radius of 300 feet. Cutters throw brush so that it does not interfere with the skidding. One man at $1.75 per day and 1 horse at $1.00 per day skid in enough trees to average 15 cords per day of 10 hours, making the cost $.18 per cord.

Sawing

A 4 horsepower gasoline saw (Domestic) rated at 4 gallons of gasoline per 10 hours and having a 28-inch circular saw was used. In actual work the engine used 5 gallons of gasoline and 1 pint of engine oil per day of 10 hours. The engine is mounted on wheels and is moved when the skidding distance becomes too great. A rollway is attached to the engine to make easy the handling of the poles and do away with one extra man. A crew of 3 operate the engine as follows: One boy at $1.25 to offbear, 1 sawyer at $2, 1 man at $1.75 to put poles on the rollway and assist the sawyer. The engine is rated at $5 per day of 10 hours, which includes gasoline, engine oil and all other charges. The crew averages 20 cords of wood per day of 10 hours, making the cost $.50 per cord.

Hauling and Delivering

The wood is hauled away in a Conkin wagon 12 feet long, 32 inches wide and 18 inches deep and holds ½ cord when the wood is carefully loaded and the top rounded up. (One cord of 4-foot wood when sawed into stove wood lengths makes two wagon loads). The wood is delivered to the town 2½ miles distant and a team makes 3 trips a day. Hauling is at the rate of $4 per day for team and driver making the cost $2.66 per cord.

Market Price

The wood sells for $2.75 per load delivered, making the cost $5.50 per cord.

Recapitulation

Cutting - - - - - - - -	$.23	per	cord
Skidding- - - - - - - -	.18	"	"
Sawing - - - - - - - -	.50	"	"
Hauling - - - - - - - -	2.66	"	"
Total cost - - - - - -	$3.57	"	"
Market price - - - -	5.50	"	"
Expenses- - - - - - -	3.57	"	"
Profit - - - - - - - -	$1.93	"	"

Ordinary custom sawing with this outfit (1 sawyer and engine) is done at the rate of $.85 per hour regardless of the amount of wood sawed. The above rate is for 1917. In the case of this kind of work the farmer is supposed to have the wood skidded in and to supply the extra help.

New Bern, N. C.

One of the officers of a local lumber company recently found that there was little to be done at his mill and so he conceived the idea of putting his fifteen employees to work cutting cordwood to relieve the local demand for fuel. The men were taken to a nearby piece of woods and the result was forty cords of firewood which were delivered to consumers by the company's motor truck. The next day twice as many men were put on the same kind of work. There are probably many towns where similar conditions prevail, and where similar simple remedies could be adopted.

In connection with the present return to wood fuel in wooded districts, it is of interest to note the observations of Marco Polo, who traveled extensively in Persia and adjacent countries in the thirteenth century, upwards of 600 years ago. In the province of Cathay he was much interested to find a strange new fuel coming into use and says: "Throughout this province there is found a sort of black stone, which they dig out of the mountains where it runs in veins. When lighted, it burns like charcoal, and retains the fire much better than wood; in so much that it may be preserved during the night, and in the morning be found still burning." He then observes that there is no scarcity of wood in the country but foresees with the growing population a great increase in the use of the new fuel as wood supplies become depleted.

In modern times the tide would seem to have set the other way; and many localities will be forced to use wood, which is a replaceable fuel, instead of coal, a nonreplaceable fuel, and whose supply constantly becomes more limited as time goes on.

The following war fuel slogans have been suggested:

"Keep up with the war program--burn wood.
"Cut-a-cord and help win the war."
"Burn wood and save coal for the war industries."
"Wood is war time fuel--cut it and burn it."
"Now is the time to cut wood."
"Coal is scarce--there's 'wood to burn'."

Several meetings have recently been held in Georgia to promote the use of wood for fuel. Lumbermen who have been present admit that there is a good deal of wood wasted in the tops of trees that they use; but claim that the shortage of labor prevents its conversion into cordwood. In some cases convict labor is being used for this purpose. The railroads offered to supply cars for the local transportation of wood as soon as a supply should be ready for shipment.

A number of cities throughout the State have prevented much suffering, especially among the poor, by the establishment of municipal woodyards. In Athens the local fuel administration has set prices of $7 a cord for hardwood and $6 for pine, delivered. In order to stimulate the cutting of wood by farmers, a standard price should be established and then this information, together with the assurance that all the wood that is offered will be taken at that price, should be circulated throughout the rural districts. Then a farmer knows that he can get a good price for his cordwood, he will be more apt to bring in all he can than if he finds that the price and demand fluctuate.

Mayor Killette has obtained five carloads of firewood for the municipal woodyard of Wilson, N. C. It is to be sold at cost, $8 per cord, to those in need. The mayor has made arrangements to cut 800 cords of standing timber and will use forty convicts in getting the work done.

Asheville, N. C.

The War Department is considering cutting a considerable amount of wood on the Pisgah National Forest to supplement the coal supply at the Spartanburg and Greenville training camps. Part of this fuel would be received from those parts of the forest where logging operations have been carried on and would result, it is said, in a more sightly appearance of the cut-over land. It is planned to establish camps of soldiers in the woods to do the cutting. After the wood is loaded on railway cars, it will be hauled part way on the tracks of a lumber company and the rest of the way on the Southern Railway.

At present there is no shortage of fuel at the camps; and it is likely that a large part of what is accumulated this year will be allowed to season until next winter. This wood will then be in a better condition to use and it may be that coal will then be more difficult to get.

The State Forester's office of Massachusetts has just issued an excellent bulletin on "Wood Fuel" with the object of stimulating the production and use of wood as fuel for patriotic and economic reasons as a war measure.

It states that wood sawing with power saws has come into general use. Wood dealers use them and in nearly every community there is a portable rotary saw with gasoline power. Seventy five cents to $1.50 per cord is charged, $1 being the usual price. Such a machine costs from $250 to $500 and will cut from fifteen to twenty cords of wood, in 4-foot lengths, into stove wood per day.

The present price for wood chopping by the cord is $1.85 to $3 when done by hand labor.

Much useful information is given on qualities of wood for fuel, what to cut, how to cut, transportation and other points.

Mr. J. S. Holmes, the State Forester of North Carolina, reports that he has in press a short circular entitled "Cordwood for Fuel." It is expected out in a few days.

Up to date the following publications on wood fuel have been issued:

Circular 79, Office of Secretary, U.S. Department of Agriculture, "Emergency Fuel from the Farm Woodland."

"Wood Fuel" by R. D. Forbes, New Jersey Department of Conservation and Development.

"Firewood" by K. W. Woodward, Extension Circular 22, N. H. Agricultural College.

"The Fuel Situation," by K. W. Woodward, Extension Press Bulletin 77, N. H. Agricultural College.

In North Carolina a short press bulletin was prepared early in the season urging in strong terms the necessity of such a campaign.

It is reported that there are large areas of stump land in the State of Michigan from which the stumps could be removed in clearing and improving the land and used for fuel to great advantage. The cost of cutting them into 16-inch lengths for fuel wood and loading them on the car is approximately $2.07 per ton and it is figured that a ton of these stumps contains from 2½ to 3 cords of 16-inch wood. The prices of green cordwood in Michigan are now ranging from $4 to $4.50 for 16-inch wood. The stump wood could, therefore, be sold much cheaper at a good profit in addition to clearing the land, which is the important consideration in developing the agricultural districts.

6Wo No. 6. January 19, 1918.

U. S. DEPARTMENT OF AGRICULTURE

Wood Fuel Items

(These items will be issued from time to time during the emergency fuel situation.)

The Coal Embargo

Owing to extreme weather and transportation conditions, an embargo has been placed at once on the use of coal for five successive days and for one day a week for a period of two months thereafter. The embargo should spell out to every village and hamlet in the land where wood is available, to have a wood fuel reserve at all times, and not depend on coal. This lesson should not have to be taught to an intelligent American public a second time. A fuelwood business must be built up. This winter is not ended and another one is less than a year distant. Let no town or community whose coal supply, through foresight or fortunate circumstances, is ample for present needs delude itself in thinking that this will be true another year.

Two things only will answer--foresight and intelligent action in advance of need.

Use of Firewood on Farms

The greatest use of firewood on farms is in the Southern States, and least in the western prairie states. Thus, Virginia and Tennessee are each credited with 19 solid cords per farm; Kentucky and Alabama 18, and North Carolina, Mississippi, and Louisiana 17 cords each. Nebraska uses only 2 cords per farm. In the northern States, from Minnesota to Maine, estimates are mostly 12 or 13 cords, Illinois dropping to 8 and Pennsylvania 7 cords. In recent years the use of coal in the place of wood has been extending; this year the high cost of coal and inadequate supply have checked this tendency. Wood fuel is coming back to its own in districts well supplied with timber but upon which coal had made inroads.

The price of firewood is affected largely by the supply of timber, by the kind of wood (hardwood being usually higher than soft), by whether green or dry, and by cost of labor. A New England reporter (in 1916) analyzes the cost as follows:

stumpage $2, cutting $1.50, teaming to house $.50, total $4; to prepare for stove, add $1.15 for sawing and $1 for splitting; making, ready to burn, $6.15 on the farm; delivered off farms, $8. On the other hand, in Pennsylvania, Virginia, and North Carolina some reporters state that the standing wood is 40 cents and cost of cutting and hauling to farmyard only 60 cents; and one correspondent in North Carolina reports that often farmers give the wood away to get it off the land.

In most parts of the United States a cord of wood is correctly understood to be 128 cubic feet: i. e., 8 x 4 x 4 feet. In parts of Ohio, Indiana, Michigan, and Wisconsin, however, a rick of firewood 8 x 4 feet but cut to 16 or 18 inch length is called a cord. Where this practice prevailed, estimates were reduced to their equivalent in solid cords of 128 cubic feet.

Firewood used on farm; estimates of number of cords (solid) used per farm, value per cord on farms (in Dec. 1916), and total value per farm; also estimates of total quantity and value of same by states:

States or Territories	Cords per farm	Value per cord	Value per farm	Total cords state	Total value state
Maine	13	$4.50	$58.50	780,000	$3,510,000
New Hampshire	12	4.60	55.20	324,000	1,490,000
Vermont	15	4.35	65.25	495,000	2,153,000
Massachusetts	10	4.70	47.00	370,000	1,739,000
Rhode Island	11	4.00	44.00	55,000	220,000
Connecticut	12	4.50	54.00	324,000	1,458,000
New York	12	4.00	48.00	2,580,000	10,320,000
New Jersey	7	4.00	28.00	231,000	924,000
Pennsylvania	7	2.60	18.20	1,526,000	3,968,000
Delaware	12	3.10	37.20	132,000	409,000
Maryland	13	3.20	41.60	650,000	2,080,000
Virginia	19	2.40	45.60	3,610,000	8,664,000
West Virginia	15	2.30	34.50	1,485,000	3,416,000
North Carolina	17	2.10	35.70	4,403,000	9,246,000
South Carolina	15	2.10	31.50	2,775,000	5,828,000
Georgia	16	2.00	32.00	4,800,000	9,600,000
Florida	9	2.60	23.40	495,000	1,287,000
Ohio	13	3.00	39.00	3,523,000	10,569,000
Indiana	12	3.30	39.60	2,580,000	8,514,000
Illinois	8	3.40	27.20	2,000,000	6,800,000
Michigan	13	4.00	52.00	2,717,000	10,868,000
Wisconsin	12	4.20	50.40	2,160,000	9,072,000
Minnesota	13	4.30	55.90	2,041,000	8,776,000
Iowa	6	4.20	25.20	1,290,000	5,418,000
Missouri	13	2.60	33.80	3,575,000	9,295,000
North Dakota	3	6.40	19.20	270,000	1,728,000
South Dakota	3	6.00	18.00	270,000	1,620,000
Nebraska	2	3.90	7.80	270,000	1,053,000
Kansas	4	3.30	13.20	720,000	2,376,000
Kentucky	18	1.70	30.60	4,770,000	8,109,000
Tennessee	19	1.75	33.25	4,750,000	8,312,000
Alabama	18	1.80	32.40	4,860,000	8,748,000
Mississippi	17	1.90	32.30	4,845,000	9,206,000
Louisiana	17	2.25	38.25	2,074,000	4,666,000
Texas	10	2.80	28.00	4,300,000	12,040,000
Oklahoma	10	2.75	27.50	2,100,000	5,775,000
Arkansas	16	2.00	32.00	3,600,000	7,200,000
Montana	9	4.50	40.50	315,000	1,418,000
Wyoming	10	3.80	38.00	150,000	570,000
Colorado	6	3.70	22.20	330,000	1,221,000
New Mexico	8	4.00	32.00	360,000	1,440,000
Arizona	8	5.40	43.20	96,000	518,000
Utah	8	4.00	32.00	184,000	736,000
Nevada	12	6.00	72.00	36,000	216,000
Idaho	9	4.60	41.40	324,000	1,490,000
Washington	12	4.50	54.00	780,000	3,510,000
Oregon	12	3.90	46.80	600,000	2,340,000
California	10	5.80	58.00	950,000	5,510,000
United States	12.5	2.75	34.35	81,875,000	225,426,000

Woodcutting Bee

Information has been received that a woodcutting bee was held in Old Lyme, Connecticut, on December 27, managed by the selectmen of the town. The town bought the wood at $1 a cord and paid the 60 men who turned out at the rate of $2.50 for cutting. About 35 cords were cut and this is to be held as a wood reserve by the town to help out the poor. It is reported that a good community spirit was developed and considerable competition stimulated with suitable prizes. The bee was so successful that there will probably be another one soon in Old Lyme. It has encouraged, so the report states, an effort to be made by the county agents to arrange for a similar bee in other places in the State.

The city of Norwich, Conn., has provided $1,000 for the use of the Chairman of the Fuel Committee in purchasing wood.

Mr. Filley, State Forester of Connecticut, and Professor Hawley of the Yale Forest School at New Haven, are planning to give talks on the fuel situation at the extension schools in the State which are to be held under the direction of the county agents during January and February.

North Carolina

It is reported that nearly all the cities and towns in North Carolina now have organized municipal woodyards. A complete list has not been received. The following more important towns all have these woodyards:

Asheville	Washington	Burlington
Fayetteville	Lexington	Durham
Tarboro	Winston-Salem	Greensboro
Hendersonville	Sanford	Winston
Morgantown	Salisbury	High Point
Henderson	Statesville	Wilmington
Wilson	Mt. Airy	

In North Carolina the Southern Railway has promised to turn over the discarded ties to the Fuel Administration gratis, and it is reported that other railways within the State have agreed to cease burning such ties as waste material and save them for fuel.

At Wilmington, N. C., on January 25, the annual meeting of the State Forestry Association will be held at which all the county farm demonstration agents will attend. An address will be made by the State Forester of Virginia on the topic, "Use of Cordwood as a War Necessity." It is expected that this meeting will assist other agencies in the State working toward this end and result in the general cooperation of the demonstration agents in pushing the production of cordwood.

Municipal Woodyard at Durham, North Carolina

Detailed information has been received on the Municipal Woodyard at Durham, N. C. The wood used is from two sources, from a sawmill about 14 miles distant from which slabs are shipped by rail and from a farmer's woodland from which cordwood in 8-foot lengths is being secured. The slabs are mostly green pine of odd lengths for which $2 per cord is charged f.o.b. cars about fourteen miles away. Freight charges amount to about $.75 per cord. The average freight car 8' x 8' x 36" would hold about 18 cords when entirely full. The coal and woodyard is directly adjacent to the railroad tracks and the wood is unloaded from the cars directly where needed by the sawyers. The wood from the farmers' woodlands nearby is green pine and oak, cut in 8' lengths and split in halves or quarters. The price piled in the woods is $3.50 per cord. It is hauled from the woods to the roadside by six county teams driven by convicts and there is piled in a long rick, from which it is loaded onto motor trucks by the convicts. Three trucks are in use, two 3-ton trucks belonging to the county and a 5-ton truck the property of the city. The trucks make four trips a day and carry about one cord per ton of rated capacity, making the daily delivery of all of them about 40 cords. The cost of hauling is about $1 per cord; it could be reduced if there were better loading and unloading facilities. The distance is 2½-3 miles.

The woodyard was sold to the city by the owner for a little over the investment value of the place and fixtures. The former owner is retained as manager by the city at $100 per month. The yard is equipped with two electrically driven circular cut-off saws and a splitting machine, which, however, is not used. About 60 cords of wood can be reduced from 8' lengths to stovewood per day.

Cordwood is sold according to the cubic contents of the wagon boxes--most of the wood being sold at the yard. The estimated cost of sawing to stove length is $.50 to $.75 per cord. It is sold at $6 per cord on the yard or $7 delivered. It is intended to run the yard at cost and the prices may be reduced in consequence at some later date.

The management of the fuelwood situation lies in the hands of a committee of three, one from the city government, one from the county commissioners, and the third the Secretary of the Chamber of Commerce, who is supposed to prevent differences between the other two regarding division of expense and of labor.

The city plans to buy 6,000 cords of standing timber at $.50 per cord in the near future to be cut and hauled by convict and city labor. They expect to handle it very cheaply by this means--about as follows:

Stumpage ----------	$ .50
Cutting & splitting -----	1.00
Hauling ----------	1.00
Sawing to stove lengths -	.75
Cost on yard --------	$3.25

Pennsylvania

The Pennsylvania Fuel Administration has sent the Forest Service plans for organizing a wood fuel campaign to all the county chairmen in the State, with instructions to proceed along the lines indicated in it.

Harvard Students Cut Cordwood

The Massachusetts Forestry Association and the Massachusetts State Forest Service are responsible for the transition from dress suit to corduroys. The plan was worked out and last Wednesday, according to a report, a crew of fifty husky young athletes went out to Waltham and started to work chopping the red and white oak of the woodlots on the Cedar Hill Farm, belonging to Miss Cornelia Warren.

The boys work from eight o'clock in the morning to half-past four in the afternoon. They are under the charge of R. M. Gibbs, an experienced forester in the office of State Forester Rane. For their endeavors the boys receive $2.50 a day, and the State is mighty glad to get them.

Maine

The "Cut-a-Cord" movement is hitting Maine vigorously. Word comes that the State Fuel Administrator, James Hamlin, has appointed Prof. Charles D. Woods as chairman of the Maine State Wood Fuel Committee and the committee has gone to work in cooperation with New England Fuel Administrator James J. Storrow, of Boston, for the purpose of converting leisure hours of the citizens into heat units from the hundreds of thousands of acres of timber in the New England States suitable for use only as cordwood.

It is hoped to restore to Maine something of her independence of half a century ago when all the work of the State was run by wood chopped from her forests.

"Does it not seem absurd," asks the fuel chairman, "that coal should be brought all the way from the mines in Pennsylvania to be burned in the homes where wood is growing abundantly almost within a stone's throw of the house?"

All the fuel administrators have proved the fact that wood is almost as valuable from a heat unit standpoint as coal. The only great difference is that the coal is more easily handled. Then why not use the wood where little handling is necessary? is the slogan of the fuel man.

Lewiston, Me.

A mill-town ordinarily burns wood in preference to coal, because the people who work in the mills during the day want fires only in the morning and evening.

A Massachusetts mill company (the Otis Company of Ware, Mass.) has agreed to furnish wood cut in stove lengths to its help for $8 a cord, while the going price there is $10 to $11. Any surplus will be sold to the public for $9. The company owns several hundred acres of woodland. This suggests one way to finance wood-cutting now, i. e., let the employers buy stumpage and have it cut, or buy the wood now and sell it to their employees later; or buy or arrange for stumpage and turn employees loose to cut their own (thus solving the labor problem). In one town near Worcester, mill-workers have been putting in evenings and Sundays cutting wood which was offered them at a low price.

The Mayor of Medford (Mass.) has a number of city employees cutting wood on city land; and has also opened the land for poor people to come and cut their own wood.

The city of Fitchburg, (Mass.) has bought a portable sawmill and is cutting on its own forest. The wood is used to help the poor and for city schools.

It is reported that members of the Lancaster (N.H.) Board of Trade have agreed to take all wood brought in by farmers at a fixed reasonable price, and are getting the wood.

New York

A conference of the Wood Fuel Committee appointed on December 26 by Commissioner Pratt was held in the office of the Conservation Commission, Albany, N. Y., on January 12.

Mr. Austin F. Hawes and Mr. C. F. Korstian of the Forest Service were present, and Mr. Hawes outlined the work which had been done in New England and some of the other states in connection with the wood fuel work.

A thorough discussion of the question was had and various details as to the conduct of future work were decided. Mr. Recknagel laid before the Committee a statement of the offer of a firm of lumbermen in the southwestern Adirondacks, which was in brief to cut cordwood on a large scale for delivery at some nearby city. The proposition was explained in detail and it was arranged that the field agent assigned to the section of the State including Oneida County, should assist Mr.

Recknagel in arranging with the Chambers of Commerce of Utica or Rome, or both, to dispose of the wood which was available, provided there was a need of such wood in the cities in question and provided the question of price could be agreed upon. It was felt that if the cities were interested, arrangements could be made to have this wood taken by the wood dealers in the cities and retailed by them at a certain specified rate of profit. Mr. Recknagel said that from 5,000 to 7,500 cords could doubtless be procured in this manner.

The question of employment of convict labor was discussed and it was resolved by the Committee that Commissioner Pratt be requested to take up with the State Superintendent of Prisons the matter of using such labor in this connection.

Frederick, Md.

In an effort to relieve the fuel famine which has been gripping this city for weeks, the mayor and city council of Frederick are planning to transport 2,000 cords of firewood from the municipal watersheds, eighteen miles north of this city, to Frederick, where it will be parceled out. Coal is to be had only in small quantities.

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No. 7. January 30, 1918.

U. S. DEPARTMENT OF AGRICULTURE

Wood Fuel Items

(These items will be issued from time to time during the emergency fuel situation.)

Do Not Cut Shade Trees for Fuel

Information has been received from some of the northern States that under the stress of securing fuel there has been some cutting of shade trees and a feeling that this may be done to relieve the acute situation. The amount of fuel afforded by such scattered trees is insignificant compared with their usefulness later. Wherever dead and diseased trees can be cut out this is an opportunity for improvement of parks and other grounds, but in no case should the wholesale cutting of live shade trees be done. The wood yielded in any necessary improvement work should of course be utilized. With a little foresight and preparation wood can always be secured in wooded districts from timber tracts which can spare it without damaging the future forests, or decreasing the beauty of the landscape. These facts should be borne in mind by all those who have charge of parks and street shade trees.

A Wood Fuel Reserve for Next Winter

From all over the country both north and south come reports of widespread interest in getting out wood for fuel to take the place of the coal shortage. On short notice there has been considerable difficulty in getting the wood in suitable form for fuel and transporting it to the market. This should bring sharply to mind the necessity of being prepared well in advance where this form of fuel must be used. There is too much a feeling, even in spite of the acute conditions in severe weather, that this is only a temporary affair and that another year plenty of coal will be available. No one knows how much coal there will be for general fuel purposes next year. With the enormous demands being made upon both coal and transportation, there is no likelihood that there will be any great abundance and a very good chance that the shortage may be more widespread and severe than this year. It is only a matter of good business foresight for those communities who have the wood around them to see that some time during the season a sufficient supply is cut and hauled where

it could be easily available as a reserve next winter. The time to cut it is right now before the spring season opens, as it will have time to season thoroughly by next winter and can be done now without diverting labor from other important work. Use the waste wood for fuel which cannot be used for other purposes.

In many cities and towns municipal woodyards have been started and are working very successfully. Such a yard should be in operation in every town where wood can be obtained and at work building up a reserve for next winter. Those locally responsible for the government of towns and communities should take early action and see that this is done, or some similar means employed to ward off a fuel shortage another year.

New York

According to a news item recently released the State Fuel Administrator of New York foresees an embargo on coal next winter to those who have access to supplies of wood. In short, coal will simply be refused to those who can get wood. With this prospect held out, a vigorous campaign has been inaugurated to build up a wood fuel supply in every community in the State and thus be protected against lack of coal next winter. This view and this action should be given heed by every northern State and similar measures taken to provide for the future.

Costs of Hauling Fuel Wood in East Tennessee

At Greeneville, Tennessee, in order to increase the supply of fuel wood, one of the leading farmers agreed to furnish the Greeneville War Fuel Corporation with wood at a low figure.

For this purpose a one-ton Ford truck used on the farm was fitted with a frame of oak and pine at a cost of $35 at a local shop. The truck cost $700 delivered in Greeneville. The frame is 66" wide, 33" high and 8 feet long, and takes a cord at a load. Two men load it from a rick of wood stacked along the pike in ten minutes. The driver unloads without cording up in ten minutes.

The distance of a round trip averages 7 miles, and 8 loads are delivered in 8 hours. This gives a mileage of 56 miles in a day which requires 6 gallons of gasoline. Gasoline sells at 25¢ wholesale, which makes the cost of gasoline 25¢ per cord. The driver is paid $2 per day and this cost is 25¢ per cord. Engine oil costs 5¢ per cord.

On a basis of a thousand cord haul it is estimated that depreciation and repairs should not amount to more than $250, which makes this item come to 25¢ per cord.

The actual costs of hauling are as follows:

Driver	25¢
Gas	25¢
Oil	5¢
Depreciation and .... repairs	25¢
Per cord.	80¢

These figures are more interesting because of the fact that they can be compared with the cost of hauling by team from a tract just across the pike. The team hauls three loads of $\frac{2}{3}$ of a cord, or $2\frac{1}{2}$ cords per day, at a cost of $4.50 for a man and team, or $2 per cord.

The wagons, however, go directly to the woods, while the truck cannot leave the pike. Therefore, to make the figures comparable 50¢ per cord must be added to the truck haul to yard the wood out to the pike.

The cost of hauling by truck is then $1.30 per cord and by wagon $2 per cord.

Weight in pounds of one cord of wood

Hardwoods	Air dry	Green
Ash, black	3200	4700
" green	3600	4300
" white	3800	4300
Aspen	2400	4200
" largetooth	2400	3900
Basswood	2300	3700
Beech	4000	5000
Birch, black (sweet)	4200	5300
" paper	3400	4600
" yellow	4000	5200
Buckeye, yellow	2200	4400
Butternut	2400	4100
Cherry, black	3200	4100
" wild red	2500	3000
Chestnut	2700	4900
Cottonwood, black	2200	4100
Cucumber	3100	4500
Elm, slippery	3600	4900
Elm, white	3100	4400
Gum, black	3200	4000
" blue	4900	6300
" red	3200	4100
Hackberry	3500	4400
Hickory, shellbark	4800	5700
" bitternut	4400	5800
" mockernut	4700	5700
" pignut	4800	5700
" shagbark	4500	5700
Hornbeam	3200	5400
Locust, black	4400	5200
" honey	4600	5800
Maple, red	3300	4600
" silver	3100	4100
" sugar	3900	5000
Oak, bur	4000	5500
" Calif. black	3400	5800
" chestnut	4100	5600
" post	4300	5700
" red	4100	5800
" Spanish	4100	5800
" Swamp white	4700	6200
" tanbark	4000	5900
" white	4300	5600
" willow	4100	6000
" yellow (black)	3900	5600
Osage orange	5000	5800
Sassafras	2900	4000
Sycamore	3200	4700
Tulip	2500	3400
Tupelo	3300	5800
Willow, black	2300	4800

Softwoods	Air dry	Green
Cedar, incense	....	3700
" Port Orford	2800	3500
" western red	2100	3400
" northern white	1900	2500
Cypress, southern	3100	4600
Fir, Douglas	3000	3400
" amabilis	2400	4000
" alpine	2100	2500
" balsam	2200	4000
" grand	2600	3300
" noble	2500	2800
" white	2300	5000
Hemlock	2600	4400
" black	2900	4000
" western	2800	3600
Larch, western	3300	4200
Pine, slash (Cuban)	4000	4800
" jack	2700	4500
" Jeffrey	2500	4200
" loblolly	3500	4900
" lodgepole	2600	3500
" longleaf	3800	4300
" pitch	3200	4900
" pond	3600	4400
" Norway	3100	3800
" shortleaf	3200	4000
" sugar	2400	4500
" western white	2700	3500
" white	2400	3500
" western yellow	2500	4400
Redwood	2300	3500
Spruce, Engelmann	2200	3500
Spruce, red	2600	3000
" white	2500	2800
Tamarack	3400	4200
Yew, western	4000	4900

Canada

Clyde Leavitt, Chief Forester of the Conservation Commission of Canada, is alive to the importance of wood fuel and the necessity of communities stocking up with a wood fuel reserve. He says:

"There must be some definite organization for utilizing the large supplies of hardwood available for fuel, but which will be utilized to only a comparatively slight extent so long as the matter is left in the hands of the regular dealers. They will not lay in large supplies in advance, for fear that the coal shortage may not exist next winter or that the war may end, in either of which events they believe they would face a material loss due to the reduction in the demand for wood with consequent decrease in price. My idea is that the city and municipal governments ought to go into the matter definitely and invest a moderate amount of money in building up a reserve of wood, which can be drawn upon whenever the coal shortage makes it necessary."

Massachusetts

The city government of Brockton has undertaken to cut 1,000 cords of fuel wood from a swamp flanking the highway between Brockton and Taunton. The extreme cold weather has made this possible, as ordinarily the ground is so soft that it can not be worked.

Paul D. Kneeland of the State Forestry Department estimates that under proper management one half a million cords could be cut annually from the forests of Massachusetts. As there is now a vast accumulation of defective and waste material, a great deal more can be cut during the period of emergency and the forests will be greatly improved by its removal. Proper cutting will supply the wood needed for fuel and at the same time prevent destruction to the forests.

Pennsylvania

According to Mr. C. R. Anderson of the Forestry Department of Pennsylvania State College, present conditions offer unusual opportunities to many of the 80,000 to 100,000 woodlot owners of the State to sell cordwood. The scarcity of coal and its present cost favor these farmers. This same situation is equally true in many other States. No fuel wood cut now is likely to go begging for a market next winter.

Minnesota

Approximately 70,000 cords of wood are being cut in northern Minnesota to relieve the fuel situation in various parts of the State, Oscar Ameson, Superintendent of Timber, said recently, under the plan endorsed by the State Public Safety Commission, allowing sales of 100 cords at 25 cents a cord of wood on State owned land. Additional application for contracts are coming in at the rate of 30 a day and two new field men have been assigned to the woods.

The press reports that W. T. Cox, State Forester, is organizing a large corporation to direct the "wood-for-fuel" movement in Minnesota. The details of the scheme are being handled by C. R. Tillotson, an expert sent to the State by the Federal Fuel Administration and the Federal Forest Service.

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No. 8. February 8, 1918.

U. S. DEPARTMENT OF AGRICULTURE

Wood Fuel Items

(These items will be issued from time to time during the emergency fuel situation.)

Build up Wood Fuel Reserves

There is one feature of the present coal shortage which should be constantly kept in mind by people with wood supplies around them. It is this, be early in the season and diligent in building up an ample wood fuel reserve for next winter. Should the shortage of coal be more widespread, more marked, and last longer next winter, as there is every promise of its doing, there would be no excuse for wooded localities not having fuel. Furthermore, the logical step to conserve the coal in such a crisis would be to place an absolute embargo on the shipping and use of coal in such communities where wood could be used. With the prospect ahead that such a step would certainly be taken by the Fuel Administration in an emergency next winter, let each community get in a supply now when the labor is more free to work at it than later in the season or the beginning of next winter. Even in normal times it should be remembered that there are two chances for failure of the coal supply: (1) Decrease in production due to various factors; and (2) a tie-up in transportation. When these happen in normal times they caused trouble. Under war conditions we have had an example of how they can be emphasized.

Do not depend upon coal for next winter. Have wood ready and you are protected.

Ohio

Lebanon, Ohio, opens municipal wood yard in 24 hours.

Lebanon, Ohio, was facing a desperate situation in the matter of supplying fuel to its homes. The local Fuel Administrator called a meeting of the men of the town in order that he may lay the matter before them. One hundred and fifty men met at the office of the Mayor, who explained the situation. A committee was appointed to act in the matter of securing wood. A call was made for the names of parties having wood, which could be cut. One thousand dollars was borrowed from one of the banks, the note being individually endorsed by all who would do so. Seventy men

signed the note The bank took the note without interest. The next morning at four o'clock a number of teams and trucks and a gang of workers were busy in the woods. The next morning the wood was being delivered at the municipal wood yard, where a rotary saw was ready to saw it into the required lengths. By the afternoon wood was being delivered to consumers, according to a report received from the State Forester, Mr. Edmund Secrest.

St. Marys, Ohio, has a unique scheme for saving coal. Consumers who come for coal must take oath that they cannot secure wood. It is working.

Maine

Wood Fuel from the Sieur de Monts National Monument

Many hundreds of cords of wood have been cut this winter for fuel from the Sieur de Montes National Monument on Mount Desert Island, Maine, under the supervision of the custodian, Mr. Geo. B. Dorr. The shortage of coal had been so acute that even the wealthiest summer residents have been refused it for their greenhouses. Hundreds of families have accordingly had to turn to the National Monument for their supply. The cutting has been confined mainly to gray birch, aspen, balsam fir, and such trees of other species as were in need of removal. The work has been carefully done and has not only assisted in relieving the fuel shortage but has decreased the fire danger, has improved the condition and appearance of the woods, and has made conditions more favorable for the deer. No charge was made for the material removed.

Louisiana

With very scant supplies of coal in New Orleans pine wood cut for stove use was selling in mid-January for $12 to $16 a cord delivered. State Fuel Administrator O'Kelly has succeeded in bringing the price delivered down to $7.50 a cord handled through a municipal wood yard in charge of the Commissioners of Public Works. Much wood is brought by water from the vast logging areas on the north shore of Lake Pontchartrain.

Next to Florida the State has probably experienced the least annoyance from lack of fuel of any state east of the Rocky Mountains.

Tennessee

SUMMARY OF THE ESTIMATED COST OF HANDLING FUELWOOD
ON YARDS AT GALLATIN, TENNESSEE

Cost of wood f.o.b. cars loading point, per cord, ...		$3.00
Average freight charge ($.70-$.90) per cord, ...		.80
Unloading on yard at Gallatin, per cord, ...		.10
Cost of manufacture, .		
(Note 1) Sawing and splitting, per cord, ...	$.60	
(" 2) Rehandling on yard, per cord, ...	.20	
Power (electric) per cord, ...	.05	
Investment, interest and repairs, cd. .	.15	1.00
Cost of delivery by truck (Note 3),		
Wages of driver per day, ...	1.50	
Upkeep of truck, oil, gas and repairs, per day, ...	.90	
Depreciation on investment, per day, ..	.75	
Interest, etc., per day, ...	.15	
	$3.30	
Number of cords delivered per day	2.67	
Cost per cord to deliver		1.25
Profit on operating, per cord		.50
		$6.65

Note 1--Two men move five cords to saw, and saw and split it in a day. Their wages are $1.50 per day.

Note 2--No rehandling necessary when less than 30 cords are on yard.

Note 3--Truck cost $800.00, depreciation $250.00 per year and upkeep $25.00 per month. Truck hauls one-third cord per trip and makes eight trips per day.

NOTE--These figures are based on only average operating efficiency and admit a 10% reduction by careful management.

Mississippi

Prof. Lloyd, Director of Extension in Mississippi, is planning a drive among the farmers for next winter's wood beginning with the let-up of farm work in August. His idea is to utilize every idle day, or day that can be spared, toward securing a big supply of wood on hand in every city, town or country place. Coal has been used almost exclusively for heating in towns along or near the railroads, and many farmers haul it five or ten miles to their homes. The weather is letting up in the Gulf States and farmers are beginning their spring work.

A wood fuel drive this mid-summer and fall will go far toward meeting the situation next winter which all agree that coal will undoubtedly be fully as scarce as during the past winter.

South Carolina and Georgia

These states have had an extremely hard winter on account of lack of coal. Many industrial plants, schools, churches, and some hotels have been forced to close for considerable periods on this account. The fuel requirements for the six military camps located within these states have taxed the wood resources severely.

In South Carolina it is reported that municipal fuel yards have been established in practically all the towns to meet the situation.

No. 9 February 19, 1918.

U. S. DEPARTMENT OF AGRICULTURE

WOOD FUEL ITEMS

(These items will be issued from time to time during the emergency Fuel situation)

Municipal Woodyards

While a few communities and towns have found it possible to get in adequate supplies of wood without any particular organization, it has usually been found necessary to have some particular committee or body to take charge of the work in order to insure its being done. This has been necessary during the present emergency in bitter weather when the actual need for wood fuel in quantity, with coal not obtainable, made it apparent to every one. With the coming of spring and the warm weather of summer, individual and popular interest in the wood fuel question will naturally lag and be crowded out by more seasonable work and interests. This decrease in interest will not, however, be followed by decreased necessity for a stock of wood for next winter. Some organization is needed to tide the matter over between the seasons and to urge and see that wood is cut when it does not seem immediately necessary. One community in New England is able to see the handwriting on the wall and has decided to purchase 100,000 cords of wood as a fuel reserve for the city and has borrowed $30,000 from the banks to finance the operation. A southern State has already some 30 municipal woodyards in operation and is planning to have one in practically every community in the State. If this is necessary in the South, as has been found so in the emergency, how much more urgent is it in the North where the winters are longer and snow, especially in northern New England, makes it practically impossible to get out much wood in the depth of winter.

See that your community has a municipal woodyard and is getting in a reserve of wood for next winter. If one is not already in operation organize it at once. Under the stress of an acute shortage, an Ohio town organized a municipal woodyard in 24 hours. Can not your town be sufficiently foresighted to organize one now in advance of need?

Cordwood for Next Winter

The State Fuel Administrator of North Carolina in a recent circular of instructions to the chairmen of the local fuel committees of the State, says:

"While we are not safely through this winter yet, the indications are now that we are going to get through without having experienced serious hardship or suffering anywhere. Next winter is going to be the rub, and we can not begin too soon to prepare for it. The next sixty days is the best period of the year for cutting cordwood, and I know of no more effective way in which you can serve your community, as a representative of the Fuel Administration, than to exercise all of your resourcefulness in inducing your municipality, your county, your wood dealers and the farmers of your county to secure the cutting of all cordwood possible during the next sixty days with a view to supplying the demands for wood which we are sure to have next winter."

Canada

At the 18th annual meeting of the Canadian Forestry Association, held at Montreal, Canada, February 6 and 7, 1918, a "Wood Fuel Symposium" was arranged and carried through on the second day. The object of the meeting and its program are given below:

"The object of this public meeting is to bring under expert discussion the many problems involved in obtaining an adequate wood fuel supply to supplement coal shortages present and future. The cordwood scarcity has proved serious for parts of Canada this winter and promises to be even more acute next winter unless immediate action can be taken by the municipalities. Most of the addresses will occupy not more than fifteen minutes each.

"The Wood Fuel Situation in Eastern Canada."--Clyde Leavitt, Chief Forester, Commission of Conservation.

"How the United States has attacked the wood fuel problem."--A. F. Hawes, United States Forest Service, Washington, D. C.

"The Situation in Quebec, Ontario, and New Brunswick" will be discussed by Mr. G. C. Piche, Chief of Forest Service of Quebec; Mr. E. J. Zavitz, Chief Forester of Ontario; Mr. G. H. Prince, Director of Forestry Division of New Brunswick.

"From the point of view of the wood fuel merchant."--Mr. G. H. Church, of Church and Church, wholesale lumber, wood, etc., Montreal.

"Railway Transportation and the Wood Fuel Problem."--Mr. Thomas Britt, General Fuel Agent, Canadian Pacific Railway, Montreal."

Massachusetts

Mr. A. F. Hawes, a representative of the Forest Service, who has recently returned from New England, believes the production of cordwood in Massachusetts has been increased by from 50 to 100 per cent over normal. This conclusion was reached after personal observations about the State, and through conversations with wood dealers, manufacturers, and local fuel committees. Some estimate the increase in the cut even higher than the above figure. Much wood has even been retailed in the large cities such as Boston and Worcester. But the greatest increase in the use of wood has been on the part of the industries. When the wood fuel campaign was started its chief purpose was to substitute wood partially for anthracite coal in domestic consumption. In Massachusetts bituminous coal has been so short that some of the larger industries have kept from shutting down only by the use of wood. The use of wood in a factory saves labor, since it can be burned in four-foot lengths.

Graton & Knight Co., of Worcester, Mass., manufacturers of leather goods, and employing about 3,000 hands have purchased 10,000 cords of wood, mostly green; the U. S. Worsted Co., about 15,000 cords; the U. S. Envelope Co., 4,000 cords. The American Optical Co. of Southbridge, Mass., is using about 25 cords a day. The above are only a few examples of the large consumers of wood, all of whom have taken up wood solely as an emergency fuel. A dealer in Palmer, Mass., reported that he had recently shipped 5,500 cords to factories in eastern Massachusetts.

The Graton & Knight Co. normally uses 50 tons of soft coal a day. During the past month they have been increasing the amount of wood, and are now mixing 15 tons of coal and 50 cords of wood daily. The conclusion is that for steam production one cord of green wood is equal to .7 of a ton of soft coal. Wood as an industrial fuel costs at least three times as much as soft coal, but this is a small item compared to the overhead expenses of the business and the loss due to shutting down. The wood costs about $10 a cord f.o.b. shipping points, and about $1 for freight; $1 for piling in the yard; and $1 for carrying into the factory. Stoking is considerably more expensive than with coal; and one-third more boiler capacity is required.

The Fuel Committee of Worcester, assisted by an Advisory Committee of the Chamber of Commerce, has decided to purchase 100,000 cords as a fuel reserve for the city. Thirty thousand dollars has been borrowed from the banks to finance the operation; and the wood will be turned over upon delivery to the various manufacturing concerns. The Worcester Water Board will cut about 10,000 cords under forestry principles on its lands.

The Fuel Committee of Worcester has found the average contents of a freight car to be as follows:

Bituminous coal - - -	40 tons
Anthracite coal - - -	37 "
Coke - - - - - - - - -	23 "

Recent Publications on Wood Fuel

"Emergency Fuel from the Farm Woodland"
by A. F. Hawes, Circular 79, Office of the Secretary, U. S. Department of Agriculture. (Contributed by the Forest Service, Washington, D. C., October, 1917.)

"Firewood"
by K. W. Woodward, Extension Circular 22, September 1917. New Hampshire Agriculture College, Durham, N. H.

"The Fuel Situation"
by K. W. Woodward, Extension Press Bulletin 77, June 1917, Agriculture College, Durham, N. H.

"Wood Fuel"
by Paul D. Kneeland and F. W. Rane, Massachusetts State Forester's Office 1917, Boston, Mass.

"Wood Fuel"
R. D. Forbes, Assistant Forester Department of Conservation and Development - of New Jersey 1917, Trenton, N. J.

A Press Bulletin was issued October 13, 1917, by the State Fuel Administrator at Greensboro, N. C., urging the cities and towns of the State to furnish wood to consumers at cost, as a war measure.

"Wood as Emergency Fuel"
by J. H. Foster and F. H. Millen, Bulletin, Department of Forestry, Agricultural and Mechanical College, 3rd series Vol. 4, No. 2, January 15, 1918, College Station, Texas.

"Cordwood for Fuel"
by J. H. Pratt and J. S. Holmes, Press Bulletin, 160 North Carolina Geological & Economic Survey, January 30, 1918, Chapel Hill, N. C.

"Wood Fuel"
by Wm. G. Howard, Assistant Superintendent of State Forests, Bulletin 16 Conservation Commission of New York, 1918, Albany, N. Y.

"Wood Fuel to Relieve the Coal Shortage in Eastern Canada"
by Clyde Leavitt, Chief Forester, Commission of Conservation, Ottawa, Canada, 1918.

"Municipal Woodyards"
by the Federal Fuel Administrator (Wood Fuel Dept.) for Georgia, Commerce, Ga., February 1918.

The State Forester of Ohio has a bulletin on the subject in press which should be available in a few days. All states where wood is available should follow these good examples and get out, locally, concise and pointed bulletins on wood fuel which could be broadcasted through the State and serve to advertise the campaign and convey needed information about wood fuel and its use in the emergency. State Foresters and State Fuel Administraters have an opportunity here to render a real service. Who will be the next to come out with a good live wood fuel bulletin? There's room for more.

A New Hampshire Community Supplies Its Own Fuel

Bartlett in New Hampshire, at the southern entrance of the famous Crawford Notch, views with complacency and not a little pride its hundred piles of fuelwood and the curling wreaths of wood smoke rising from its chimneys. There is plenty of fuel in Bartlett.

Without any organization, public meetings, acute fuel shortage or any other urgent circumstance but the thrift of its people, this village of about 500 persons has cut and removed from the surrounding forest more than a cord and a half of fuelwood for every person, old or young, resident there.

Sixty-two families, purchasing a total of 565 cords, secured their fuel under the supervision of the U. S. Forest Service from a nearby portion of the White Mountain National Forest. With few exceptions each individual purchaser cut his own wood. During the Fall, Sunday was often a Gala Day. Whole families pichicked in the woods and not infrequently the ladies lent a hand with axe or saw.

Yellow birch, beach and maple were the woods cut.

The stumpage price paid was	$1.00	per cord.
The cost of hauling was . .	1.50	" "
Hired choppers received . .	2.50	" "

Bartlett is not demanding coal and there is no fuel shortage. Already arrangements are being made for next year's fuel supply and the cut is expected to exceed that of 1917.

Missouri

Excelsior Springs, Missouri, held a wood-cutting bee on February 5, under the auspices of the Commercial Club as an aid to coal conservation. Between one and two hundred business and professional men participated. The bee was very appropriate, as it was staged on an area recently cut over for other purposes. The wood will be hauled to the city by volunteers and placed at the disposal of the Associated Charities and the Fuel Administration.

New York

The press reports that New York is to have a wood fuel survey of the State to determine how much wood is quickly available for fuel purposes in each county, and the means of marketing it. This movement is directed jointly by the State Conservation Commission and the New York State Forestry Association, according to the report. Five men will make the survey and submit the information obtained to the fuel administrators of the respective counties.

Many other states can make this survey to advantage. Why not follow this example?

Use of Wood Fuel

With the approach of spring light firing will be sufficient and for this purpose wood is admirably adapted. Where a fire is needed only night and morning practically all wood can be used and thus effect a great saving in coal. The following directions give in detail how to handle wood fuel used separately or in combination with coal in furnaces or open fires.

Directions for Using Wood in Coal Furnaces

Enclosure with letter from P. B. Noyes dated February 15, 1918.

by E. H. Lockwood)

How to Operate a Coal-Burning Furnace with Wood

No. 1 Using a Combination of Wood and Coal

This is the simplest way to use wood in a coal furnace, and the most effective in producing heat.

The method of firing is to place blocks of wood on the fire to about the level of the fire door, instead of shoveling on coal in the usual way, then add coal on the top which will fill the crevices between the wood, making a level fuel bed with the coal on top. A fuel charge of this kind will produce good heat but will not last as long as a fire pot full of coal, hence more frequent attention is needed.

From 25 to 50 per cent of the coal can be saved by substitution of wood in this way. Any kind of wood can be used that will go into the fire pot, hard or soft, large or small, and will burn with good efficiency when surrounded with coal.

Any size of coal or coke can be used, but the small sizes fill in best between the chinks in the wood. Buckwheat coal can be burned successfully in this way, and its low price will help to offset the higher price of block wood, making an economical combination.

Caution.--When burning the small sizes of coal take care to avoid gas explosions by always leaving a flame burning on some part of the fire; in other words, do not cover the whole fire with fresh fuel at one time.

No. 2 Using Wood Only in a Coal Furnace

There are difficulties in burning wood as a substitute for coal in a steam, hot water or warm air furnace, but it can be done with a fair degree of success, especially in mild weather.

The best form of wood is short blocks, 8 to 12 inches long, preferably hardwood, although mixed hard and soft, or even soft wood alone can be used. A medium size of block, such as that found in ordinary cordwood, is suitable, although larger blocks keep the fire better.

The best method of firing is to keep the furnace full of blocks packed close together, with a moderate draft to give the desired amount of heat. As the wood burns, more should be added in order to keep the deep bed of burning fuel which is best for economy.

It is not necessary to buy new grates for burning wood, although the ordinary coal grate is not well adapted for wood. A good way is to add a little nut coal to the fire at the start, allowing the layer of coal ashes to remain on the grates. Air required for combustion can pass up through the ash layer, which can be shaken lightly without much loss to the ash pit.

The explanation of the difficulty of burning wood in a coal furnace is to be found in the difference between these two fuels.

Average wood has twice the bulk of coal, but only half of its heating value. Hence, for equal heat capacity the fire-box of a wood furnace should be four times as large as that of a coal furnace where the fire-box is not large enough for the fuel.

Banking the fire at night requires an extra supply of the largest blocks and special attention to closing the dampers tight. Experience will show the best way, but it can be done with success in most furnaces.

No. 3 Using Wood in Fireplaces

Where a fireplace is available wood can be used to good advantage, affording both heat and ventilation. Its value is for supplementary use with a furnace, although it may replace the furnace in fall and spring with decided economy.

Few persons know that a wood fire can be kept burning night and day in a fireplace with very little attention and with small consumption of wood. One user in New Haven reports continuous use of a fireplace in this way for over a month, with dry chestnut wood, where the amount of ashes formed by a month's use was not enough to require removal.

Fireplace wood is usually cut in longer lengths, but the ordinary 16-inch stove length is convenient. Any kind of wood can be used, provided it is dry and seasoned.

The secret of fireplace management is a plentiful supply of ashes, which should be kept at the level of the andirons.

As the blocks burn, an accumulation of glowing charcoal forms by falling into the ashes, which keeps on burning slowly and assists igniting of fresh blocks on the andirons. A pocket may be formed in the ashes into which the hot charcoal may fall, forming a heat storage. Two or three blocks on the andirons with the hot charcoal in the ashes will form an excellent fire.

To check the fire, shovel ashes over one or more of the blocks, covering lightly all the burning wood. This will not put out the fire--it will only check the rate of burning and red charcoal will be found when the ashes are removed for addition of fresh fuel.

A banked wood fire will keep 10 or 12 hours and will send some heat from the hot bricks all the time. A well-managed fireplace will be found a great addition to the heating system in any residence.

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No. 10. February 28, 1918.

U. S. DEPARTMENT OF AGRICULTURE

Wood Fuel Items

(These items will be issued from time to time during the emergency fuel situation).

Permanent Wood Fuel Committees

Under the spur of necessity of the past winter many excellent local organizations have been built up all over the country for the particular purpose of seeing that wood fuel is cut in greater quantities, distributed and used. When these bodies were being organized the thought uppermost, of course, was to provide for urgent current needs. Now that spring and summer are coming with their demands for labor, time and energy, the fuel question is too apt to be overlooked, and at the beginning of next winter the country will face the same situation as it did when bitter weather came the past winter. The best and most reasonable way to provide fuel ahead of time, especially in the case of wood fuel, is to keep the present committees and other organizations alive through the entire year and let the object be to provide emergency fuel for the period of the war. There are many ways in which wood fuel can be obtained and times at which it may be cut through the summer season if there is some particular organization to look after it. If it is left to individual effort, there is too much chance that nothing will be done.

Do not, therefore, let information from any source serve to disorganize your wood fuel committees by predicting that the coal shortage is only temporary. Remember that there may be an abundance of coal but no transportation to bring it to the consumers.

Canada

In the midst of one winter Canada prepares for the next. The following resolutions dealing with the wood fuel supply another winter were adopted by the Ottawa Board of Trade, January 25, 1918:

WHEREAS it is the opinion of the Ottawa Board of Trade, that the Fuel situation in Canada is sufficiently serious to warrant immediate action being taken as an emergency measure to anticipate an even worse situation during the winter of 1918/19, and as a considerable saving of coal can be accomplished by the burning of wood, it is hereby resolved,--

A--That we would suggest to the Council of the City of Ottawa that immediate steps be taken by them to secure this winter as large a supply of cordwood as possible for the use of its Citizens during the winter of 1918/19, even should such action ultimately result in a decided loss to the City in the venture.

B--That all Boards of Trade and other organizations throughout Ontario, and other Provinces, having the same anticipated conditions to face, should immediately inaugurate a campaign to have the rural population assist the Cities by not only producing all the cordwood they can for their own use, thus saving coal which they have undoubtedly heretofore used to a certain extent, but providing a larger quantity of both wood and coal for the more thickly populated Cities and Towns.

C--That in order to assure the further use of cordwood as fuel, and conservation of coal, the Fuel Controller or Provincial Governments, wherever the necessary power rests, should consider where cordwood is available, if necessary, the issuance of an order restricting the burning of coal for heating purposes for the fall period of 1918 up to and including Nov. 30th, or for such period as in their judgment the situation at the time warrants.

Definite authority has also been secured by Ottawa to spend $100,000 on wood fuel.

Michigan

On February 15, 1918, W. K. Prudden, Federal Fuel Administrator for Michigan, sent out the following statement:

TO THE PEOPLE OF MICHIGAN

Warmer weather and the present easing up of the coal situation are apt to cause people to overlook the necessity of providing against a recurrence of hardship next winter. I therefore warn the people of Michigan that next winter is likely to develop a worse fuel situation than the present one. Getting coal is a matter of getting transportation. To get transportation is going to be increasingly difficult. With a coal shortage, nothing but a wood supply can prevent our going cold. There is wood available. It can be gotten at reasonable prices. To get it in sufficient quantities will require very prompt action. To postpone action until another fuel famine is here will be foolhardy. Green wood is about half water. Green wood is heavy and expensive to handle. Green wood yields only a third to a half the heat of dry wood, making it by that much more expensive as fuel. To season wood properly requires that it be dried for three months or more. If seasoned wood is to be available by next November, cutting must be started at once and on a large scale.

I urge that individuals take prompt steps to insure themselves of next winter's fuel wood. I urge that towns and cities take steps to lay up a reserve of fuel wood to approximate one-half their total fuel requirements.

February 21, 1918.

COMPARATIVE HEAT VALUES OF WOOD

Heat Values of cordwood, based on Madison Laboratory weights for oven-dry, air-dry, and green woods and assuming 7,350 Btu available per pound of dry wood with flue gases at 300° F.

Species	Available heat units per cord of 90 solid cu.ft. (in millions Btu)		% of short-ton Coal value	
	Air-dry	Green	Air-dry	Green
Alder - red - A. Oregona	14.8	13.0	57	50
Ash - biltmore - F. biltmoreana	20.7	20.0	80	77
black - F. nigra	18.5	16.5	71	64
blue - F. quadrangulata	21.3	20.7	82	80
green - F. lanceolata	20.6	19.6	79	75
oregon - F. oregona	19.7	19.0	76	73
pumpkin - F. profunda	19.4	18.2	75	70
white - F. americana	20.5	19.9	79	77
white - (second growth)	23.0	22.4	88	86
Aspen - P. tremuloides	14.1	12.1	54	47
largetooth - P. grandidentata	14.2	12.4	55	48
Basswood - T. americana	12.6	11.0	48	42
Beech - F. atropunicea	20.9	19.7	80	76
Birch, paper - B. papyrifera	18.2	16.7	70	64
sweet - B. lenta	23.3	21.9	90	84
yellow - B. lutea	20.9	19.4	80	75
*gray - B. populifolia	17.5	16.1	68	62
*red - B. nigra	17.5	15.7	68	60
Buckeye, yellow - A. octandra	12.8	10.1	49	39
Buckthorn - R. purahiana	20.2	18.6	78	72
Butternut - J. cinerea	14.3	12.2	55	47
Chinquapin, western - C. chrysophylla	17.2	13.9	66	53
Cherry, black - P. serotina	18.5	17.3	71	67
wild red - P. pennsylvanica	14.2	13.5	55	52
Chestnut - C. dentata	15.6	12.9	60	50
Cottonwood - P. trichocarpa	12.8	10.5	49	40
- P. deltoides	15.0	12.7	58	49
Cucumber - M. acuminata	17.8	16.0	68	62
Dogwood, flowering - C. florida	25.2	23.7	97	91
western - C. nuttallii	22.4	21.4	86	82
Elder, pale - S. glauca	18.4	15.2	71	58
Elm, cork - U. racemosa	22.6	21.5	87	83
slippery - U. pubescens	19.1	17.1	73	66
white - U. americana	17.7	15.8	68	61

Gum, black -N. silvatica	18.5	17.4	71	67
blue -Eu. globulus	24.1	22.4	93	86
cotton -N. aquatica	18.5	16.2	71	62
red - L. styraciflua	17.7	16.0	68	62
Hackberry -C. occidentalis	19.1	17.7	73	68
Haw, pear -C. tomentosa	24.8	23.1	95	89
Hickory, shellbark - H. laciniosa	24.8	23.1	95	89
bitternut -H. minima	24.2	22.2	93	86
mockernut -H. alba	25.4	23.8	98	92
nutmeg -H. myristicaeformis	22.0	19.9	85	77
pecan -H. pecan	24.2	22.5	93	87
pignut -H. glabra	25.9	24.7	100	95
shagbark -H. ovata	25.4	23.8	98	92
water -H. aquatica	24.5	21.6	94	83
Holly - I. opaca	19.6	17.8	75	68
Hornbeam - O. virginiana	24.7	23.5	95	90
Laurel, california - U. californica	20.7	18.8	80	72
mountain -K. latifolia	24.9	23.2	96	89
Locust, black -R. pseudacacia	26.5	25.4	102	98
honey -G. triacanthos	24.5	22.5	94	87
Mondrona - A. menziesii	22.6	20.9	87	80
Magnolia, evergreen - M. foetida	18.4	15.5	71	60
Maple, oregon - A. macrophyllum	17.7	16.3	68	63
red -A. rubrum	19.1	17.6	73	68
silver -A. saccharinum	17.9	16.4	69	63
sugar -A. saccharum	21.8	20.4	84	78
Oak, bur -Q. macrocarpa	22.6	20.8	87	80
cal, black -Q. californica	20.5	17.7	79	68
canyonlive -Q. chrysolepis	27.5	25.7	106	99
chestnut - Q. prinus	22.4	20.7	86	80
cow -Q. michauxii	24.0	22.1	92	85
laurel -Q. laurifolia	21.7	19.6	83	75
Pac. post -Q. garryana	25.3	23.4	97	90
post -Q. minor	24.0	22.2	92	85
red -Q. rubra	21.7	19.6	83	75
spanish -Q. digitata	20.4	18.1	78	70
spanish -Q. pagodaefolia	24.0	21.9	92	84
swamp white - Q. platanoides	25.1	23.4	97	90
water - Q. nigra	21.7	19.7	83	76
tanbark -Q. densiflora	21.7	19.4	83	75
white -Q. alba	23.9	22.4	92	86
willow -Q. phellos	21.2	19.3	82	74
yellow (black) Q. velutina	22.0	19.7	85	76
Osage orange -Tox. pomiferum	30.8	30.1	118	116
Persimmon -D. virginiana	25.0	24.0	96	92
Rhododendron - R. maximum	19.5	17.2	75	66

Sassafras -S.sassafras	17.2	15.7	66	60
Service-berry - A.canadensis	26.1	25.2	100	97
Silverbell - Mohrodendron carolinum	17.2	15.7	66	60
Sourwood - Oxydendrum arboreum	19.9	18.2	77	70
Sumac - R.hirta	17.9	16.9	69	65
Sugarberry - Celtis mississip	18.5	17.1	71	66
Sycamore -P.occidentalis	18.5	16.6	71	64
Umbrella -Mag.fraseri	15.5	13.8	60	53
Walnut,black -J.nigra	20.8	18.6	80	72
Willow,black -S.nigra	13.5	10.9	52	42
western black - S.lasiandra	15.5	13.4	60	52
Witch hazel -H.virginiana	21.8	20.1	84	77
Yellow poplar -L.tulipfera	15.1	13.9	58	53
Cedar,incense -L.decurrens	14.5	12.3	56	47
Port orford -C.lawsoniana	16.3	15.5	63	60
western red -T.plicata	12.1	11.7	47	45
white -T.occidentilis	11.3	10.7	43	41
Cypress,bald -T.distichum	16.4	14.5	63	56
yellow -C.nootkatensis	15.8	15.1	61	58
Douglas fir -Pac.coast - P.taxifolia	17.7	17.3	68	67
Rocky Mts -	15.6	15.1	60	58
Fir, alpine -A.lasiocarpa	12.0	11.5	46	44
amabilis -A.amabilis	15.1	12.9	58	50
balsam -A.balsamea	13.5	11.5	52	46
lowland white -A.grandis	15.1	13.3	58	51
noble -A.nobilis	14.3	13.7	55	53
silver,white -A.concolor	14.3	11.1	55	43
Hemlock,black -T.mertensiana	17.2	15.7	66	60
eastern -T.canadensis	15.0	12.8	58	49
western -T.heterophylla	15.0	13.5	58	52
Larch,western -L.occidentalis	19.3	17.9	74	69
eastern -L.americana	19.1	18.1	73	70
Pine,cuban,slash - P.heterophylla	22.4	21.6	86	83
jack -P.divaricata	15.7	13.4	60	52
jeffrey -P.jeffrey	15.0	12.9	58	50
loblolly -P.taeda	19.9	18.1	77	70
lodgepole -P.contorta	15.0	13.8	58	53
longleaf -P.palustris	22.0	21.1	85	81
norway -P.resinosa	17.8	16.8	68	65
pitch -P.rigida	18.5	16.4	71	63
pond -P.serotina	20.0	18.7	77	72

Shortleaf -P.echinata	19.9	18.5	77	71
sugar -P.lambertiana	14.3	11.7	55	45
table mt -P.pungens	19.3	17.2	74	66
western white -P.monticola	15.7	14.6	60	56
w.yellow -P.ponderosa	15.0	13.1	58	50
white -P.strobus	14.2	12.9	55	50
Spruce-Engelmann - P.engelmann	11.9	10.5	46	40
red -P.rubra	15.0	14.2	58	55
sitka -P.sitchensis	13.5	12.7	52	49
white -P.canadensis	14.1	13.5	54	52
Yew, western -T.brevifolia	24.4	23.2	94	89
Redwood -S.sempervirens	14.3	12.9	55	50

Coal - long ton	29.1
short ton	26.0

*gray and red birch estimated.

Note - - - Values given for resinous woods are low, since resin adds to heating value. For instance, dry longleaf pine with 20 per cent resin has a value of approximately 26,400,000 Btu instead of the 22,000,000 given in the table.

The amount of bark in a cord of wood also affects the heating value, for instance bark of birch, Douglas fir, western yellow pine, and others have a higher value than the wood. Much of the theoretical value of both wood and coal is lost in use. While anthracite and soft coal have about the same theoretical value, only 70 to 75 per cent of this value is realized with anthracite and 60 to 65 per cent with bituminous coal.

Values decrease as temperature of flue gases increase.

To get values for wood only partly seasoned, it may be assumed that in most cases it will be about half seasoned in three months, and two-thirds seasoned in six months, and entirely air-dry in about a year.

New Hampshire

The following manufacturing and other plants are reported running with wood fuel.

Concord:
Abbott Downing Co. (manufacturers of silverware)
Page Belting Co.
State House
State Hospital Greenhouse

Penacook:
Standish Mills

Contoocook:
Silk Mills

Merrimack County Farm

Missouri

A campaign for the production and use of more wood fuel in Missouri has been started at the suggestion of the U. S. Department of Agriculture and the U. S. Fuel Administration. A State Wood Fuel Committee has been formed consisting of Hon. Wallace Crossley, Federal Fuel Administrator for Missouri; Hon. F. W. McAllister of the State Council of Defense, C. F. Korstian of the U. S. Fuel Administration and the U. S. Department of Agriculture, A. J. Meyer of the State Agricultural Extension Service, and Frederick Dunlap of the College of Agriculture at Columbia.

Each county will have a similar committee made up of the County Fuel Administrator, who will act as chairman, the Chairman of the County Council of Defense and the County Agricultural Agent.

Tennessee

Fuelwood Conditions in Chattanooga, Tennessee

Chattanooga's fuelwood using up to the 5-day closing order was almost entirely confined to the burning of waste from the sawmills and woodworking plants. The ruling that wood could be burned during that time was a sufficient incentive to the Chattanooga Manufacturers' Association to get them to appoint a fuel committee on January 28th, and hire a man to get in wood. Action was so prompt that already 750 cords have been shipped to Chattanooga by this Association.

Their practice has been to buy the wood f.o.b. cars at Chattanooga at a cost of $4.50 per cord. The cars were delivered to the different manufacturers, no wood being sold in less than car lots.

As an indication of extent to which wood was used, the following list of purchasers of wood from the Manufacturers' Association is suggestive:

1	Furniture	Manufacturer
1	Lumber	"
2	Stove	"
2	Foundry	"
1	Tannery	"
1	Plow	"
1	Wheelbarrow	"
1	Coffin	"
1	Spinning	"
2	Hosiery	"
1	Chair	"
1	Pencil	"
1	Patent Medicine	

About five of the local coal yards have handled 50 to 300 cords of wood each. Independent manufacturers shipped 150 cords of wood, and about the same amount came on farm wagons.

Chattanooga is not in position to take care of the wood situation this winter. The Manufacturers' Association is interested in wood only for themselves in car lots, and have no means of selling such wood for domestic purposes. The dealers can not be depended upon to take the proper steps to get wood.

Chattanooga needs a Wood Fuel Company, as the city should provide a wood fuel reserve of at least 6,000 cords for next winter.

This wood is obtainable largely by wagon and truck haul in the summer, although a portion would require short rail transportation.

Wood Fuel Conditions in Knoxville, Tennessee

The wood used for fuel in Knoxville is supplied chiefly from sawmills, woodworking plants, the municipal woodyard and farm wagons. The sawmills and the municipal woodyard are the principal distributors of wood.

The price of wood in Knoxville this winter has been lower than in many of the smaller towns in the State. The municipal yard delivers heater blocks or stove wood, at $2 per load, or about $8 per cord. Farm wood on February 11 sold at $6.75 per cord for green oak stove wood, and at $5 per cord for 8 ft. split oak. The mill waste has been sold at 75 cents to $2 per load, depending on the material and the size of the load.

The municipal woodyard was started in November as a branch of the city coal yard which supplied municipal institutions. The outfit included a set of cut-off saws, a 10 h.p. motor and a small shed, and cost approximately $400.

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The municipal woodyard was started in November as a branch of the city coal yard which supplied municipal institutions. The outfit included a set of cut-off saws, a 10 h.p. motor and a small shed, and cost approximately $400.

Four men saw 15 cords in 9 hours. They get $1.75 per day; the labor is costing about 50 cents per cord; power costs 7½ cents a cord. The cost of splitting is figured at nothing as a load of blocks weighs 800 pounds and of stove wood weight 550 pounds the cost of splitting being saved in wood.

So far something over 500 cords have been purchased at $4 f.o.b. cars Knoxville. One man unloads a car a day at a cost of 10 cents per cord.

Delivery is made by the city trucks which carry a half cord in two compartments. They make 8 to 10 trips in good weather, and 5 to 6 trips in bad weather. The cost of delivery, not allowing for idle time, is approximately $1 per cord in good weather, and $1.25 per cord in bad weather. The trucks are "Republics" and cost $850 each; the driver gets $2 per day. The woodyard has a storage capacity of only 150 cords and can cut and haul a car (15 cords) each working day.

There is no reason why Knoxville could not get in 5,000 cords of wood as a reserve for next winter. This amount is available within a few miles of the city.

The Municipal yard, as at present equipped, can not handle more than half of this amount. It could be extended more cheaply than any other organization could go into business.

If the city will agree to go into it more extensively, that would be the best procedure; otherwise a War Fuel Company will be necessary.

Maryland

In order to insure a wood fuel reserve for next winter, the banks of Talbot County, Maryland, are advancing to the farmers $1 per cord, or about the cost of cutting. The loan is made on the signed order of the local Fuel Committee to reliable individuals when it is known that the wood has been cut. The farmer is held responsible for the wood on demand. This is one feature of a definite working plan for the county to run itself on wood fuel next winter. Local committees for each community have been appointed by the County Fuel Committee to be held responsible for handling the local fuel situation. The county normally uses 25,000 tons of coal which means cutting about 35,000 cords of wood. Twenty-five per cent cut of the wood needed next fall and winter is to be cut now in order to get it seasoned, the balance to be cut in the fall for use in the winter. Two thousand cords of mixed p' gum, and oak are being bought up by the town of Easton part of the reserve supply.

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No. 11. March 11, 1918.

U. S. DEPARTMENT OF AGRICULTURE

Wood Fuel Items

(These items will be issued from time to time during the emergency fuel situation)

Wood Fuel Surveys

How many cords of fuelwood does your community have? In the general and widespread use of wood fuel which is being developed in the emergency, it is important to know how much fuelwood in cords there is in the country and its local distribution and availability. A few states have been able to see this and have started preliminary survey work or are making plans to put it under way in the near future. Many questions of course can come into the use of wood fuel besides the mere total amount. The total amount should first be known, however, and then how this is divided up. Part of it will be found to be on land which is suitable for clearing for agriculture, and which will be cleared and improved in the near future. Obviously the timber on such tracts can all be cut and its entire removal will not injure the permanent forest resources. Another part of it will be found on land which should be retained in woodland, and here the question is how much can be cut out safely. In a few cases clear cutting may be done of overmature and damaged stands, but these are merely incidental. As a rule, only a certain percentage can be cut out with safety for future forest resources. After the point of the quantity or percentage which can come out of the stands, another important question is how much strictly fuelwood there is. The trees which may be cut, for example, may be suitable for lumber, ties, telephone poles, and other higher uses of wood. Therefore, it is essential to know, not only the total amount in cords, but the amount of strictly fuelwood in cords which can come out with safety to the forest, with consideration of the suitability of the timber which is cut, for other forest products.

In this survey shade trees and timber in parks should not be included, as there is no need, even in this emergency, to destroy the beauty of the landscape to supply fuel. It is a matter of making a common sense provision in advance and not waiting for a shortage to strike a community and then lay waste all the timber regardless of its proper use.

In remedying the fuel situation, a wood fuel survey should be one of the first steps in the process, as far as wood is concerned. Find out how much wood is in your community in cords and how much of it is suitable for fuel. Do this by means of your present organizations, or take steps to organize and secure advice for the purpose.

Richmond, Va.

THE OFFICE OF FEDERAL FUEL ADMINISTRATOR BYRD FOR VIRGINIA, FEBRUARY 25, 1918, ISSUES THE FOLLOWING:

The problem of a fuel supply is not yet completely solved. The coming warm weather will, of course, render the situation less acute. Next winter, however, the shortage of coal will again make itself felt, and conditions will very likely be worse then than during the past winter unless those who can do so provide themselves in advance with supplies of wood fuel. It is, therefore, urged that all householders who can do so, especially those in small towns and rural districts, make arrangements in advance to insure their receiving an ample supply of wood. Even those who burn coal would do well to have on hand a reserve supply of wood so that in case their regular delivery of coal is interfered with they will have something to fall back on. The general coal situation should be watched. If in any locality it happens that the supply is less than usual or is slow to arrive this may be taken as a reminder of the fact that coal cannot be depended on and that an emergency supply of wood should be accumulated.

New Mexico

It is reported that an increased demand is springing up for cordwood for fuel on the Gallinas Division of the Lincoln National Forest in New Mexico. The U. S. Forest Service is running an advertisement for a sale of 25,000 cords in a local paper. An emergency sale for 500 cords has already been made. It is expected there will be considerable demand for fuelwood for the military camps at Douglas, Arizona, and Deming, New Mexico.

Pennsylvania

According to a press report a municipal woodyard was established and worked successfully in Reading, Pa. the past winter.

Municipal Woodyard at Durham, N. C.

Mr. Burke Hobgood, Secretary of the Chamber of Commerce, reports that a municipal woodyard was established November 15, 1917, at Durham, N. C. It has purchased 1,260 cords of wood of which 1,105 have been delivered by cars and 155 by motor truck. The average cost at the yard is $5 a cord. There have been delivered to consumers 968 cords in 3,821 separate loads. The average cost to consumer has been $7 delivered.

South Carolina

It is reported that around Greenville, cotton mills are laying in wood for next winter to supply the mills in case of shortage, in addition to their usual supplies of wood fuel for the operatives.

Missouri

At Cameron, in the northwest part of the State, the wood is quite generally hauled to town in the form of block wood and sold by the 26-inch wagon-box load, which when well corded in and well rounded out on top is equivalent to about one-half cord. The wood consists largely of oak, elm, walnut and maple and most of it is hauled from a distance of four to five and one-half miles. Four-ft. cordwood sells at from $5 to $5.50 per cord delivered in Cameron.

The cost of reducing small quantities of 4 ft. cordwood to stove-wood is estimated to be from $1 to $1.50. This is frequently done by custom power sawing, which allows a very good profit to the sawyer. Splitting is estimated at 50 cents per cord. The cost of stove wood to the consumer in Cameron is estimated as follows:

	Minimum	Maximum
Cost to retailer	$6.00	$7.00
Delivering	1.00	1.50
Splitting	.50	.50
Total cost	$7.50	$9.00

With efficient organization, methods and proper regulation, wood should not cost the consumer more than $7 or $8 per cord. The best grade of Illinois lump coal sells at $6.75 per ton in Cameron.

Maine

As a result of the coal shortage the farmers of Aroostook County, Maine, have reaped a harvest from selling cordwood which they have cut and hauled to market.

A large amount of the wood was sold in load lots on the streets and by contract. The prices received average $10 per cord for green wood and $12 to $15 for slab wood; but when it is considered that the cost of stumpage is $1.50 per cord with $3.50 per cord for cutting and that there is an average haul of from 18 to 20 miles for the round trip, it seems that the farmer is only receiving a fair day's pay for himself and team. There is an added cost to the consumer of $1 per cord for sawing, which is done with portable saws operated by small gasoline engines.

Splitting and storing the wood at a cost of about $1.50 per cord makes a total cost to the consumer for green wood under cover of about $12.50 per cord.

The wood is cut in 12, 16 and 24 inch lengths, according to the use to which it is to be put. The large growth is usually sawed into 16-inch lengths and a considerable amount is split up and sold as slab wood. Most of the wood for fuel is maple, birch and beech. The maple and birch are considered the most desirable as beech does not have the heating qualities of the other two. A cord of this wood, when stored dry and cured under cover, is equal in value to a ton of anthracite coal.

Approximately 24,420 cords were cut for the farmers' use and 26,400 cut and sold to the towns and villages of the county.

New York

This State has been making a preliminary survey of wood fuel conditions and their relation to the coal supply during the last two months. Twenty-nine counties have been covered and a brief report submitted for each one.

Such a survey yields not only urgently needed information for the present but will serve for a thorough preparation for next winter.

Other states should initiate such a survey where it has not been done, or take some action to find out how much fuelwood there is available. Delay is not wise.

Tennessee

Mr. G. H. Lamb, who has just returned from two months field work in the State, reports the following as the result of a detailed survey of fuel conditions by the State Fuel Administration, in which he assisted:

In 1917 Tennessee consumed 4,874,964 tons of coal exclusive of that used at the mines and by the railroads. This was nearly a million and a half more tons than has been normally consumed in the State up to this time and in spite of this increase in the amount of coal consumed, several shortages existed in many parts of the State. A preliminary survey of the coal requirements for 1918 shows that at least 5,302,071 tons will be needed and this amount of coal is necessary even after reductions of 40 to 50 per cent are made in domestic coal for different counties due to proposed substitution of wood.

Ordinarily this wholesale substitution of wood fuel would make Tennessee's coal requirements less for 1918, but the development of large war industries this year will take an additional half million tons in 1918. After January 1, 1919, these war industries will consume about one and a half million tons of coal a year above the normal requirements. In spite of the fact that coal was scarce in 1917 the consumption was 343,777 tons greater than normal. This was due to the enlarging of the State's industries and the very severe winter which required more coal for heating purposes.

Tennessee's production of about 7,500,000 tons must not only largely take care of this increase in the use of coal in the State, but it is also being called upon more and more to supply coal to points formerly supplied by the Alabama coal field where the production of 13-20 million tons is now almost entirely required for war industries and shipping.

Under the most favorable conditions production can be increased to a limited extent, but transportation and labor problems make large increases in productions impossible.

The total amount of wood burned in Tennessee in 1917 was 4,220,886 cords, an increase of 64,258 cords over the normal amount used in the State. This relatively small increase is due to the fact that little or no extra wood was cut for this winter and much of the extra consumption this winter occurred after January 1, 1918.

The wood used in the State is chiefly confined to the farms and inland villages where 3,904,178 cords were consumed in 1917. Cities, towns

and villages located on railroads burn normally 259,175 cords, but in 1917 was increased to 309,663 cords. It is estimated that for 1918 the wood used in towns will be increased to 500,631 cords, or an increase of 190,698 cords. By a strong publicity campaign, or by definite regulation this amount could be more than doubled. Besides the wood burned in the country and the coal hauled directly from the mines to the farms, 170,966 tons of coal were hauled from the railroad to farms or to towns off the railroad. Of this amount approximately 20,000 tons are necessary for shops, engines, etc., but 150,000 tons of this coal could and should be replaced with wood.

Altogether it is easily possible for 600,000 cords of additional wood to be used in 1918 which would release approximately 400,000 tons of coal. Of this amount of coal saved, one-third will be to the credit of the farms and inland towns and two-thirds to the credit of the railroad towns and cities.

Changes in Wood Fuel Campaign

With the approach of warm weather in the southern states the field force has been withdrawn and assigned to other work on the timber supply project. Baker, Munns, Korstian and Lamb, who were working in these states, have returned and are preparing for field work on the new project.

A meeting was held in the office in which there was a thorough discussion by all the field men present of the wood fuel work and methods of getting results. As it will soon be necessary to drop active field work in the North as it has been in the South with the advance of the season, the question of how to keep the movement alive during the summer when there is practically no popular interest in it, was talked over. Plans were laid to keep as much interest in it as possible through the local committees and other officials more or less directly concerned.

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No. 12. March 28, 1918.

U. S. DEPARTMENT OF AGRICULTURE

WOOD FUEL ITEMS

(These items will be issued from time to time during the emergency fuel situation)

Summer Work on Wood Fuel

With the approach of spring an important practical question arises of just how far wood fuel preparation should go and not neglect more timely work in crop production on the farms. Obviously not a great deal of active wood cutting can be done in the rush of spring work. Plans can, however, be laid to utilize every spare moment in shaping waste wood into fuel for next winter at home and for sale to nearby villages and industries. The wood fuel committees should be kept intact and the municipal woodyards, where established, although not actively engaged in the preparation and distribution of wood, should maintain their organization and have a plan ready for getting up the needed wood fuel for next winter. If nothing can be done now, be ready for work early next fall. Communities should figure on their needs for both wood and coal and realize that coal may not be forthcoming and wood must be used in its place. Already, according to press reports, the Fuel Administration has sent out a warning that the coal mines must be kept working through the summer and that they have fallen behind, the past week, 500,000 tons. As individuals it is up to each one to see that his own needs are provided for in accordance with the new demands made by the nation at war for an enormous amount of coal. Do not wait until there is an emergency demand at the approach of bitter weather next winter, but get out the wood now at odd times from waste material and rest assured there will be a ready market for more than is cut.

Emergency Use of Wood Fuel by Manufacturers in New England

At the beginning of a campaign for an increased use of wood in order to save coal for cities and the industries, and shipping, it was expected that the greatest increase would come through domestic use and largely on the farms and in the villages. While this is true over a large part of the country, it is surprising to find that a great deal of cordwood has been

used for fuel in the factories in New England. As coal was practically cut off, it was a question of using wood fuel or closing down the factories. Although the use of wood at short notice and in large quantities made it cost more than coal, this increased cost was a negligible factor in comparison with closing down the entire plant. It is likely that factories will be run another winter more than the past winter on wood fuel, since it has proven practicable. To some extent large industries in Kentucky also used wood fuel and the cotton mills of the South expect to use it next winter according to present reports. Should this movement extend to other manufacturing regions, the saving in coal will be considerably more than anticipated by an increased domestic use of wood fuel alone. And this saving will be needed.

Important Points in Wood Fuel Work

At a meeting held in the Office of Forest Investigations on March 12, participated in by a number of the field men on wood fuel work, the following points were brought out:

(1) That in order to make the best progress in getting wood fuel prepared during the summer, it should be stated by those responsible for the fuel question just what the outlook was for next winter. It was felt that by June 1, it ought to be possible to make a reasonably accurate prediction of what the coal situation would be next winter.

(2) That a wood fuel manual should be ready for use by August 1, when it is expected to launch an active campaign for bringing up wood reserves before winter closes in. This manual should contain the basis of the cost of wood, such as the amount handled on sleds by teams in the North, on wheels in the South, and the shipping capacities of cars of different dimensions for 4-foot wood and stove wood, figures from factories which have burned wood as to the relative cost of power by wood and by coal, some simple directions for cutting fuel wood in different sections of the country, and that every effort should be made to keep the present wood fuel organizations alive and working as much as possible through the summer.

(3) It was the general consensus of opinion that the fixing of a maximum price on wood would not be a good general policy, as this price would depend so much upon local conditions that it would be hard to adjust equitably and might tend to limit production to such an extent as to defeat the entire campaign for increased use of wood fuel.

(4) Municipal woodyards were greatly favored, as it seems to take something of this kind in all but the most exceptional communities, to handle the matter satisfactorily, especially in emergencies. It furthermore insures a reserve supply and tends to keep prices from soaring, and the cost of wood within reasonable limits.

(5) The question of municipal forests was brought up and it was agreed by all that the acute need for emergency fuel would furnish one of the strongest arguments for maintaining a municipal forest by a city or town in wooded districts where this is possible. These emergencies may be expected periodically and a municipal forest serving as a park and pleasure ground in the interim would come into play as a fuel reserve in time of stress when coal could not be obtained in sufficient quantities for the needs of the community. It is a point well worth considering thoughtfully by every community which has woodland adjacent to it which could be used for this purpose. Doubtless in the future there will be many of these forests in the older settled sections of the country, when it is found how easily they are handled and how advantageous they are in so many respects.

Use of Wood Fuel on Farms in 1917

Approximately 83,000,000 cords of firewood were used on the farms of the United States, according to estimates made by crop reporters of the Bureau of Crop Estimates in December, 1917. Similar estimates made in December 1916, indicated about 82,000,000 cords used. The average number of cords per farm was 12.6 in 1917 and 12.5 in 1916. The price of wood advanced 25 per cent during the year, from an average of $2.75 per cord in December in 1916 to $3.42 in December, 1917. On the basis of prices reported last December, the value of firewood used on farms of the United States is about $283,000,000 or $43.13 per farm. In these estimates a cord is reckoned as 128 cubic feet.

FIREWOOD USED ON FARMS

State	No. farms 1917 est., 000 omitted	Cords per farm	Total cords 000 omitted	Price per cord Dec. 1917	Price per cord Dec. 1916	Total of wood used, basis Dec. 1917 prices: Per farm	Total of wood used, basis Dec. 1917 prices: Total 000 omitted
Maine	60	13	780	$6.40	$4.50	$83.20	$ 4,992
New Hamp.	27	12	324	6.40	4.60	76.80	2,074
Vermont	33	15	495	6.00	4.35	90.00	2,970
Massachusetts	37	10	370	6.35	4.70	63.50	2,350
Rhode Island	5	10	50	5.80	4.00	58.00	290
Connecticut	27	13	351	6.00	4.50	78.00	2,106
New York	215	14	3,010	4.60	4.00	64.40	13,846
New Jersey	33	8	264	5.10	4.00	40.80	1,346
Pennsylvania	218	9	1,962	3.50	2.60	31.50	6,867
Delaware	11	13	143	4.20	3.10	54.60	601
Maryland	50	13	650	4.15	3.20	53.95	2,698
Virginia	190	18	3,420	3.20	2.40	57.60	10,944
West Virginia	99	16	1,584	2.90	2.30	46.40	4,594
North Carolina	259	17	4,403	2.75	2.10	46.75	12,108
South Carolina	185	14	2,590	3.00	2.10	42.00	7,770
Georgia	300	16	4,800	2.50	2.00	40.00	12,000
Florida	55	11	605	3.10	2.60	34.10	1,876
Ohio	271	13	3,523	3.60	3.00	46.80	12,683
Indiana	215	12	2,580	3.70	3.30	44.40	9,546
Illinois	250	9	2,250	4.60	3.40	41.40	10,350
Michigan	209	13	2,717	5.25	4.00	68.25	14,264
Wisconsin	180	13	2,340	5.50	4.20	71.50	12,870
Minnesota	157	11	1,727	5.40	4.30	59.40	9,326
Iowa	215	5	1,075	4.70	4.20	23.50	5,052
Missouri	275	13	3,575	3.20	2.60	41.60	11,440
North Dakota	90	3	270	7.50	6.40	22.50	2,025
South Dakota	90	3	270	6.20	6.00	18.60	1,674
Nebraska	135	3	405	4.25	3.90	12.75	1,721
Kansas	180	6	1,080	4.25	3.30	25.50	4,590
Kentucky	265	18	4,770	2.20	1.70	39.60	10,494
Tennessee	250	19	4,750	2.20	1.75	41.80	10,450
Alabama	270	18	4,860	2.00	1.80	36.00	9,720
Mississippi	285	16	4,560	2.30	1.90	36.80	10,488
Louisiana	122	15	1,830	2.50	2.25	37.50	4,575
Texas	430	9	3,870	3.40	2.80	30.60	13,158
Oklahoma	210	10	2,100	3.10	2.75	31.00	6,510
Arkansas	225	19	4,275	2.35	2.00	44.65	10,046
Montana	35	10	350	4.80	4.50	48.00	1,680
Wyoming	15	10	150	4.50	3.80	45.00	675
Colorado	55	6	330	4.50	3.70	27.00	1,485
New Mexico	45	9	405	4.20	4.00	37.80	1,701
Arizona	12	9	108	5.75	5.40	51.75	621
Utah	23	8	184	5.00	4.00	40.00	920
Nevada	3	11	33	7.00	6.00	77.00	231
Idaho	36	9	324	5.00	4.60	45.00	1,620
Washington	65	11	715	5.20	4.50	57.20	3,718
Oregon	50	12	600	4.70	3.90	56.40	2,820
California	95	10	950	7.40	5.80	74.00	7,030
United States	6,562	12.6	82,777	5.42	2.73	43.15	282,915

Do Not Burn Log Heaps

Now is the time to make a change in the oldtime custom of burning up log heaps following the clearing of new land. Unless this matter is strongly urged through county papers and other publicity agencies, large quantities of wood will be thus wasted which should be laid aside for fuel next winter. If the farmer can not use the wood himself, doubtless some neighbor, schoolhouse, or church will be glad to have it when cold weather comes. Thousands of farmers must provide themselves with wood for next winter in place of the coal they will not be able to get.

The railroads which were accustomed to burn the discarded ties annually have largely stopped this practice to conserve fuel. Let others who have quantities of apparently useless wood do the same. Postpone burning your waste wood. Sharp need will arise for it next winter.

How to Change a Coal-burning Furnace for Wood Fuel

Burning wood in a furnace designed for coal without first making a very simple change is likely to be an expensive proposition. The thing to do is to remove the grate bars, lay some fire brick in the floor of the ash pit, and build a wood fire on the fire brick. By keeping the ash pit door tightly closed and the ventilator opening into the fuel door open, a wood fire can be made to burn very slowly. This method of handling makes the furnace into a Wilson Heater, which is one of the most economical stoves for wood burning.

New York

Albany, March 20. The heating value of a cord of dry hardwood is practically identical with that of a ton of coal, according to a report sent yesterday by the Glens Falls Insurance Co. to the Conservation Commission.

In order to eliminate guess-work in this much discussed question, the Glens Falls Insurance Co. report that they conducted during the coldest period of the winter a definite fourteen-day test in their building at Glens Falls. During one period of seven days nothing but wood was used to heat the building and during the other seven days only coal was used. The average outdoor temperature, day and night, during the coal period was three and one-tenth degrees above zero, and the average daily consumption of coal was 1.18 tons. The average outdoor temperature, day and night, during the wood period was two and two-tenths degrees, and the average daily consumption of wood was 1.21 cords. The temperature of the building was maintained at 70-72 degrees day and night throughout both periods, excepting on the two heatless Mondays when the temperature ranged from 60-68 degrees. No additional labor was required for firing when wood was used, and the same men did the work throughout both tests.

The wood used was dry chestnut, red oak, beech, birch, maple and poplar--one-half chestnut and the balance scattering through the other varieties.

Minnesota

Cost and selling price of fuelwood at the following towns on the Great Northern Railway; Bagley, Shevlin, Solway and Wilton, Minnesota, for season ending March 1st, 1918. Average six-mile haul.

POPLAR	Per Cord
Average paid for cutting	$1.50
" " " hauling	1.50
Loading on cars	.50
Shrinkage, expense, carrying charges, etc.	.50
Selling price f.o.b.	$4.50

JACKPINE	
Average paid for cutting	$1.50
" " " hauling	1.50
Loading on cars	.50
Stumpage	1.00
Shrinkage, expense, carrying charges, etc.	.50
Selling price f.o.b.	$5.00
Average shipping weight per cord 2,500 lbs.	

TAMARACK	
Average paid for cutting	$1.75
" " " hauling	1.75
Stumpage	1.00
Shrinkage, expense, carrying charges, etc.	.50
Loading on cars	.50
Selling price f.o.b.	$5.50
Average shipping weight 3,400 lbs.	

BIRCH	
Same as tamarack except stumpage $1.50	
Selling price f.o.b.	$6.00
Average shipping weight 3,600 lbs.	

Wood Fuel Items

These items, which have appeared from time to time since December 15, 1917, will be discontinued for the summer with this issue. This is done because of other interests crowding in at this season, making this medium untimely. The effort to increase wood fuel reserves will, however, be continued by other means. An earnest appeal is made to each one who has this work in charge to leave no stone unturned to forward the movement of getting fuel prepared and transported to the consumer through the summer.

Now is the time for forethought and foresight,--and not next winter.

No. 13 September 12, 1918.

UNITED STATES DEPARTMENT OF AGRICULTURE

Wood Fuel Items

Cut Fuelwood Now

As the cool weather approaches, particularly in northern sections, the fuel question again becomes a timely and very pressing one. Repeated warnings have gone out that there is a coal shortage to face, and with the experience of last winter's attempt to make an inadequate coal supply meet the stimulated demand in bitter weather early and effective measures should be taken to get out wood everywhere it can be had.

Now is the time to cut it when unused labor is available and to give time for seasoning. Even with other pressing work there are a number of days at this season on most farms which can be used in getting out wood fuel.

Many farms now have their home supplies, but in certain localities not much is cut beyond this amount. This means no reserves for the villages that are likely to be without coal at some time through the coming winter. Can not this be foreseen by the community leaders? Action is called for now, whether a particular village may be fortunate enough or not to get coal. A reserve stock of wood should be on hand in any event. Coal may be supplied the early part of the winter and fail later when most needed because of insufficient production

or tied-up transportation. Either event will cause hardship and suffering unless a reserve is on hand.

To insure safety at this point, get out an ample reserve supply of wood fuel now while there is a chance to cut it and season it.

Seasoned wood will give a higher heat value per unit of labor than green wood - and labor is scarce.

Wood Fuel Committees

These committees should be at once reorganized in every community if they have been allowed to lapse, or appointed if none exist. They are now needed to do many things, as to find out the total fuel needs, whether the reserve is adequate, where wood fuel can be obtained, to point out means of getting it out, to organize distribution, marketing, and a hundred other things. These committees will be very busy this winter and will be able to perform good service for their respective communities in easing the blow of the fuel shortage which is coming this winter when zero weather strikes home and blizzards cripple transportation.

See that your community has a wood fuel committee organized and that it is taking intelligent action ahead of the fuel game, and not dragging behind waiting for coal.

The Coal Situation

What chance is there for coal for everybody this winter? This question does not need an answer. Coal is short, and is

going to stay short so far as the total need is concerned. Eighty (80) million more tons at least are needed than was produced last year. In 1916 a little over 500 million tons of bituminous coal were produced; in 1917 this was increased to 554 million tons; this year it is estimated that 735 million tons of both anthracite and bituminous coal will be needed, of which 100 million tons are anthracite, leaving a total of 635 million tons of bituminous needed for 1918 (up to April 1, 1919).

There is no hope that this 80 million tons increase will be produced. It is expected to make up the difference by saving. This too can not be done.

The Federal Fuel Administration in a publication called "Fuel Facts" issued August 1, 1918, says:

> "Now, in midsummer of the nation's second war year, it is certain that the nation's enormous demands for fuel cannot be fully met. Although 700,000 miners work to the limit, and the transportation agencies of the country strain every nerve to facilitate distribution, the war demand for fuel will inevitably outstrip the possible output."

And again:

> "Two factors limit the production of bituminous coal (the main reliance). The first of these is transportation. Bituminous coal cannot be dug from the ground and stored at the mine. Every hour that a mine produces coal there must be available at the mouth of the mine railroad cars to carry the product away. If the cars are not there production stops."

The obvious demands on the railroads for war transportation show clearly enough the difficulty here.

The Fuel Administration does not expect to fill the entire coal demand by increased production, but hopes to cover part of the balance by saving coal.

Here is where increased wood production can and must help. No community which has wood should be allowed to use coal for any purpose except where wood fuel is absolutely unsuited. Here is where real saving can be done, and it is practically an undeveloped means.

Italy's Fuel Problem

As an example, in a measure, of how war changes the fuel conditions of a country the present situation in Italy may be examined. The chief of the Italian Coal Mission in London states, according to the Manchester Guardian of August 19, that Italy, a country without any steam coal of her own, has been changed from an agricultural country to an industrial one by the war. As a consequence there has been an enormous demand for coal. Practically all the coal imported goes to the railways and munition works. The coal merchant has long gone out of business, as what little coal is left is doled out to the most important industries by the government. He states that the amount of coal consumed by the railways is prodigious and bears no relation to pre-war demands because of increased haulage due to unavoidable necessities of war routing by indirect routes.

So far has this gone, it is reported, that in a single month recently the Ministry has bought 50,000 tons of olive wood for the railways. This means that Italy is cutting down her olive groves for wood fuel.

While Italy is an extreme case on account of its scarcity of natural forests, it affords an object lesson of the war's enormous increased demands on coal. It also warns this country to use wood fuel resources early and wisely wherever such fuel can fit in to supplement coal.

This lesson can not be made too plain or repeated too often.

Reserve Stocks of Wood Fuel

Practically no figures exist on the amount of wood fuel cut in the country and ready for use next winter. Every community should know how much wood has been cut for firewood. It is a vitally important matter. Rest assured the local fuel question will not take care of itself this winter.

New York

The State of New York is reported to have, practically ready for use, a motion picture film showing wood fuel operations.

Minnesota

It is reported that the State Fuel Administration has required that sawmill towns use all the sawmill waste to supplement the reduced quantity of coal which will be allotted to such communities.

Doubtless many other states could take this action to good advantage in sections where active milling operations are going on. Clearly such communities do not need coal.

No. 14. October 25, 1918.

UNITED STATES DEPARTMENT OF AGRICULTURE

WOOD FUEL ITEMS

Fuelwood Machinery

The customary way of preparing firewood for use until recently has been by very primitive and laborious methods. This was due to the fact that wood has been more used in isolated places and most extensively before labor-saving machinery was developed. Little attention was of course given to wood fuel when coal came into general use and thus early methods of production were practically unchanged.

The fuel emergency which came with the war made a sudden demand upon wood for fuel in unexpected places. Something was needed to supplement coal on the farm, in the villages and even for factory fuel in manufacturing sections. On such a scale the axe and hand saw were about as equal to producing fuelwood as beating out grain with a flail in comparison with a steam power driven threshing machine, or hand methods in preparing cotton compared with the modern gin.

So machinery had to be devised and adapted in systems for quick production. A portable gasoline buzz saw with swing attachment for poles greatly increases the output per unit of labor; a power driven wood splitter is a further advantage and conveyors arranged to carry the wood to and from the saws and splitting machines enables a still greater production with less

men. Automatic feeds for both saws and splitters might possibly be devised and further reduce the labor required. Swinging conveyors are now advertised which will permit the greatest quantity of wood without hand labor to be piled at one set-up.

The prices of this equipment are approximately as follows:

6½ horsepower gasoline engine (weight 1,400 lbs.)	$260.00
6½ horsepower gasoline engine with 28-inch buzz saw (with trucks weight 2,700 lbs.)	375.00
28-inch buzz saw and frame, including pole saw table 7 feet long	61.00
1 to 2 horsepower single wood splitter (weight 1,300 lbs.)	175.00
2 to 4 horsepower double wood splitter (weight 1,800 lbs.)	225.00
12-foot wood conveyor with attachments . . . . . ($1.50 extra per foot for extension beyond 12 feet)	25.00
Extra attachment for moving conveyors in a circle	12.00

The greatest advantage will be derived where a large quantity of wood can be handled at one set-up. A buzz saw may be used where only a few cords are to be cut and effects the greatest saving of labor if the wood is brought to the saw in the longest lengths that can be handled. Ordinarily a splitter is not a particular help unless a large quantity of wood can be handled at one point. It does save some labor, however, on small jobs and may be used anywhere if desired.

With a 26-inch saw driven by a 6 to 8 horsepower gasoline engine and double action 500 lb. splitter, a four-man crew will average 12 to 15 cords (128 cu. ft. to the cord) a day sawed into 16-inch stove lengths and split ready for use. This is at the rate of 4 to 5 cords per man per day.

A gasoline engine in a tractor or in an auto can be used if a special one for the purpose is not available, or a steam threshing engine can often be pressed into service for power.

By the use of the proper machinery only, can labor be reduced to the minimum and a great quantity of wood produced quickly at a low cost, as in any manufacturing process.

The following firms manufacture machinery used in the production of firewood:

MANUFACTURERS OF PORTABLE WOOD SAWING OUTFITS

Georgia

Woodruff Machinery Mfg. Co.	Winder

Illinois

Appleton Mfg. Co.	Batavia
Challenge Co.	"
Charter Gas Engine Co.	Sterling
Stover Mfg. & Engine Co.	Freeport

Indiana

E. C. Atkins & Co., 402 S. Illinois,	Indianapolis
Famous Mfg. Co.	East Chicago
Geo. H. Bishop & Co.	Lawrenceburg
Chandler & Taylor Co.	Indianapolis

Iowa

American Engine & Tractor Co.	Charles City
Cherokee Mfg. Co.	Cherokee
Inter-State Engine & Tractor Co.	Waterloo
Waterloo Gasoline Engine Co.	"

Massachusetts

Hildreth Bros.	Harvard
Simonds Mfg. Co.	Fitchburg

Michigan

Wm. E. Hill & Co.,	Kalamazoo
M. Garland Co.	Bay City
Greenville Implement Co.	Greenville
Lewis T. Kline	Alpena
Moore Plow & Implement Co.	Greenville
Port Huron Engine & Thresher Co.	Port Huron

Minnesota

Enterprise Machine Co., 1114 South 3rd St.,	Minneapolis
R. R. Howell & Co., 31st Ave., S.E. & 4th,	"
New Winona Mfg. Co.,	Winona
Chas. A. Stickney	St. Paul

Missouri

Kansas City Hay Press Co.	Kansas City
Curtis & Co. Mfg. Co.	St. Louis
Whitman Agricultural Co., 6900 S. Broadway,	St. Louis

Nebraska

Ford Tractor Co., 2043 N. St.,	Lincoln

New Jersey

American Sawmill Machinery Co., 124 Hope St.,	Hackettstown

New York

American Sawmill Machinery Co., 1574 Terminal Bldg.	New York
S. K. Campbell Co., (Ltd.)	Central Bridge
Consolidated Gas & Gasoline Engine Co., 202 Fulton Street	New York
Ireland Machine & Foundry Co.	Norwich
Joshua Oldham & Sons, Inc., 114 Liberty St.,	New York
Tenpas Iron Works	Clymer
Worthington Pump & Machinery Corp., 113 Broadway,	New York

Ohio

Advance Mfg. Co.	Hamilton

Pennsylvania

J. W. Connor & Son (Orangeville Agricultural Works)	Orangeville
A. B. Farquhar	York
New Holland Machine Co.	New Holland
Hertzler & Zook Co.	Belleville
P. E. Shirk	Blue Ball
Spangler Mfg. Co.	York

Vermont

Abenague Machine Works, Westminster Station
A. W. Gray's Sons, Middleton Springs
Lane Mfg. Co., Montpelier

Wisconsin

Freeman Mfg. Co.	Racine
The John Lauson Mfg. Co.	New Holstein
Lauson-Lawton Co.	De Pere
Monarch Machine Works	Milwaukee
Jos. Woodsedalek	Algona
Turner Mfg. Co.	Port Washington

MANUFACTURERS OF WOOD SPLITTING MACHINERY

Alabama

Huntsville Foundry & Machine Works Huntsville

Georgia

*Woodruff Machinery Mfg. Co. Atlanta

Maine

Clark Foundry Co.	Rumford
Waterville Iron Works (Pulpwood)	Waterville

Massachusetts

Geo. G. McLaughlin Mfg. Co., 812 E. 6th St.,	Boston
H. C. Dean Machine Co.	Fitchburg
*Hildreth Bros.	Harvard

Michigan

Lewis T. Kline	Alpena
Hill-Curtis Co.	Kalamazoo

Minnesota

*R. R. Howell & Co. Minneapolis

New Jersey

W. H. Baker, East Trenton Machine Works, Trenton

*Also included in list of portable wood saw manufacturers.

New York

Sandy Hill Iron & Brass Works	Hudson Falls,
Carthage Machine Co.	Carthage

North Carolina

Glascock Stove & Mfg. Co.	Green Boro
Wysong & Miles Co.	"

Oregon

Multnomah Iron Works	Portland

Pennsylvania

*Spangler Mfg. Co.	York

Vermont

*I. F. Gray's Sons	Middletown Springs
*Lane Mfg. Co.	Montpelier
Olin Scott	Bennington

Wisconsin

Smalley Mfg. Co.	Manitowoc
Allis-Chalmers Mfg. Co.	Milwaukee

DRAG SAW MANUFACTURERS

Georgia

*Woodruff Machinery Mfg. Co.	Atlanta

Illinois

*Appleton Mfg. Co., D	Batavia

Michigan

General Machinery Co.	Bay City
"Hicazoo" Gasoline Drag Saw, Hill-Curtis Co.	Kalamazoo

Minnesota

*R. H. Howell & Co.	Minneapolis

*Also included in list of portable wood saw manufacturers.

Missouri

Advance Saw Co., 3926 La. Ave., St. Louis
*Hartman Agricultural Co., 6900 South Broadway, St. Louis

New York

*American Sawmill Machinery Co., Church St., New York

Ohio

Dixie Portable Drag Saw, Peter Gerlach Co., Cleveland

Oregon

Multnomah Iron Works, Portland
The Wade Drag Saw, R.M.Wade & Co.,331 Hawthorne Ave., Portland
The Thomas Portable Drag Saw, The Thomas Engineering Works, 125 East Water St., Portland
Vaugn's Portable Drag Saw, 475 East Main St., Portland

Pennsylvania

*A. B. Farquhar Co., Ltd., York

Vermont

A. W. Gray's Sons, Middletown Springs

Wisconsin

Smalley Mfg. Co., Manitowoc

Florida

An excellent report comes from Florida of preparedness along wood fuel lines. As early as the first of September practically every farmer had firewood for sale. The Fuel Administrator for the State put on a thorough and effective advertising campaign which met with a hearty response from the

*Also included in list of portable wood saw manufacturers.

people. The results were so pronounced that dealers state that they have done a record business in wood fuel during the early summer and fall.

When it is remembered how far south Florida is located it is realized that September is early in the season to be prepared. Northern states, where much more fuel is needed and where weather conditions make it difficult to get out wood fuel in winter, should take note and bestir themselves to a like progressive action. Many northern states last year found themselves without fuel in midwinter when deep snow made it difficult and expensive to get wood. Will this happen to your State again this winter?

If the South finds early action necessary, how much more so is it true in the North where the winters are much more rigorous and long drawn out.

Iowa

Even west of the Mississippi River from a prairie state with scant timber fringing the streams, comes word of early and energetic wood fuel preparation. The following statement is taken from the "Hardwood Record" for September 10:

"Iowans Sawing Wood"

"Cross cut saws, buck saws and axes are making sounds like victory for the United States in its war against Germany, throughout Iowa. They are being wielded by men who are putting wood into shape to be used as fuel this winter. Their employment is a part of a plan inaugurated by Charles Webster, federal fuel administrator for the State, to conserve coal during the coming winter months. Three million cords of fuelwood is the mark set by the State administration to be reached by November 1. Iowans generally are cooperating and it is expected there will be no difficulty on that score."

Why can not other better wooded eastern states figure on their total fuel needs and take vigorous action early in the season to prepare a certain definite amount of fuelwood? This is another practical means of conserving coal and safeguarding the State. Are all State fuel administrators sure that they are making full use of this means?

New England

The New England Fuel Administration (the middle of September) reports that many manufacturing companies' mills in Massachusetts have very large supplies of wood fuel stacked up in their yards ready for use next winter.

Pennsylvania

Firewood at Stroudsburg sells at $9 to $11 per cord. The coal allotment for domestic use is 3/4 of the amount used last year.

At Perkasie one party has sold 115 cords of wood by weight at 25¢ per 100 lbs., and figures that this equals about $9 per cord dry and $11 per cord green.

England

The United States is not alone in its campaign to increase the use of wood fuel. According to "The Timber Trades Journal" of August 31, 1918, published at London, the utilization of the forest resources of Great Britain for fuel is receiving attention, and a scheme is being worked out by which

very large supplies of wood fuel will be available this winter. The Timber Controller, in an interview, stated that the timber felling at present going on all over the British Islands represented about 15,000,000 tons per annum. From the timber felled about 1,000,000 tons of firewood would be available provided the necessary transport and labor were forthcoming.

A half a cord of hardwood equals about one ton. Therefore, expressed in cords approximately 500,000 cords of fuelwood are available annually.

Egypt's New Fuel

In "The Forecast" for July, 1918, is noted the use of cottonseed oil cake for fuel on a large scale. 85,000 tons of this material is produced annually in that country and for lack of shipping facilities large stocks have accumulated. As there is practically no local consumption and coal is high priced($80 per ton) the oil cake (price $15 per ton) has found use as fuel. 1-3/4 tons of cottonseed oil cake is equal to one ton of north country large coal in calorific value.

It is stated that the oil cake "is now being largely used in place of coal in boiler plants, in hotels, in restaurants, and in private houses. Boilers and stoves, it appears, are not detrimentally affected through the burning of cake. One large concern saves two men per boiler in burning cake instead of coal. Cake ash has a value as fertilizer of about $25 per ton."

The use of this valuable material for fuel is, of course, not expected in America and not necessary where other substitutes for coal are available, especially wood.

Publications

Issued: "Burn Wood & Save Coal." Office of State Forester, University of Virginia, Charlottesville, Va. Forestry Leaflet No. 19, Aug. 26, 1918.

In press: "The Use of Wood for Fuel." The Forest Service, Washington, D. C.

In press: "Machinery for Cutting Firewood." The Office of Farm Management, Department of Agriculture, Washington, D.C.